



ADVANCED INDUSTRIAL RESOURCES, INC.

COMPLIANCE TEST REPORT
CARBON BAKE UNITS CB2
CARBON BAKE UNITS CB3
AT
MAGNITUDE 7 METALS TREATMENT PLANT

PREPARED FOR:



**MAGNITUDE 7 METALS
391 ST. JUDE INDUSTRIAL PARK
MARSTON, MISSOURI 63866**

PREPARED BY:

**ADVANCED INDUSTRIAL RESOURCES, INC.
3407 NOVIS POINTE
ACWORTH, GEORGIA 30101
PROJECT ID: KR-10743**

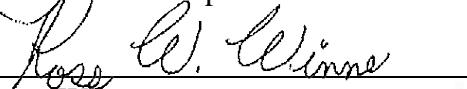
**TEST DATE:
MAY 11-13, 2021**



ADVANCED INDUSTRIAL RESOURCES, INC.

REPORT CERTIFICATION SHEET

Having conducted the Technical Review of this report, I hereby certify the data, information, results, and calculations in this report to be accurate and true according to the methods and procedures used.

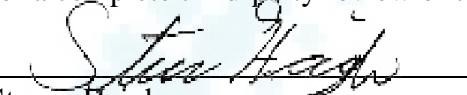


Ross Winne
Technical Director
Advanced Industrial Resources

June 7, 2021

Date

Having written and prepared this report, I hereby certify that the data, information and results in this report to be correct and all inclusive of the necessary information required for a complete third-party review of the testing event.

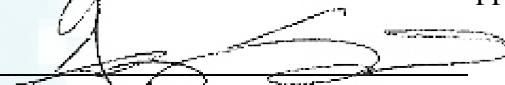


Steven Haigh
Report Preparation Director
Advanced Industrial Resources

June 7, 2021

Date

Having supervised all aspects of the June and September field testing, I hereby certify the equipment preparation, field sample collection procedures, and all equipment calibrations were conducted in accordance to the applicable methodologies.



Greg Essig
Field Project Supervisor
Advanced Industrial Resources

June 7, 2021

Date

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1.0 INTRODUCTION

1.1 SUMMARY OF TEST PROGRAM

Magnitude 7 Metals operates a primary aluminum reduction facility located at 391 St. Jude Industrial Park in Marston, Missouri 63866.

Testing was conducted on the exhaust stack(s) of the carbon bake units CB2 and CB3 to demonstrate compliance with the applicable mercury (Hg) emission standards established in the facility's air permit and 40 CFR Part 63, Subpart LL.

Testing was conducted on May 11-13, 2021 on CB2 and CB3 in accordance with a Missouri Department of Natural Resources (MDNR), approved Site-Specific Test Protocol (SSTP). All testing was conducted by Advanced Industrial Resources, Inc. (*AIR*) in accordance with approved USEPA Methods (i.e., 40 CFR Part 60 Appendix A, Methods 1, 2, 3, 4, and 29).

1.2 KEY PERSONNEL

The key personnel who coordinated the test program and their telephone numbers are:

Nancy Halford, <i>Magnitude 7 Metals</i>	573-643-0023, x-2184
Derek Stephens, MSEE, VP/QA Director, <i>AIR</i>	404-843-2100
Ross Winne, Technical Director, <i>AIR</i>	404-843-2100
Greg Essig, Field Test Director, <i>AIR</i>	404-843-2100
Steven Haigh, Report Preparation Director, <i>AIR</i>	404-843-2100
Scott Wilson, Program Director, <i>AIR</i>	800-224-5007

2.0 PROCESS AND SAMPLING LOCATION DESCRIPTIONS

2.1 PROCESS DESCRIPTION

The exhaust gases from the anode baking furnaces are ducted to fluidized alumina dry scrubbers and baghouses before being emitted to the environment. The flow of contaminated air is used to fluidize and suspend the scrubbers' alumina bed as the fluoride gases are being adsorbed onto the alumina. The "scrubbed" air then passes through a baghouse to remove the particulate before being released to the ambient air. The fluoride enriched alumina is collected and returned to the Pot room to be used as feedstock for the reduction cells. The fluoride captured in the "scrubbing" process helps reduce the amount of fluoride added to the reduction process to maintain the proper chemistry for the reduction process. Emissions from the aluminum process are controlled by baghouses and dry alumina scrubbers.

Emissions from the Carbon Bake Unit 3 (CB3) are tested in a single horizontally oriented duct while the emissions from the Carbon Bake Unit 2 (CB2) are vented to atmosphere through sixteen (16) exhaust stacks arranged in four (4) sets of four (4) stacks each. Sampling for CB2 was conducted from one (1) representative stack from each of the four (4) sets of stacks.

2.2 SAMPLING LOCATION DESCRIPTION

The exhaust stacks of CB2 including CB2-5, CB2-6, CB2-7, and CB2-8 each have circular cross sections with internal diameters of 11.75 inches. The sampling locations are located at least 8.3 equivalent diameters downstream from the nearest upstream flow disturbance and at least 2.0 equivalent diameters upstream from the nearest downstream flow disturbance or stack exhaust. The stacks are equipped with two sampling ports oriented 90 degrees to one another in a plane perpendicular to the flow direction. Eight total sampling points (four points per port), were used for USEPA Methods 2, 3, 4 and 29 sampling, in accordance with USEPA Method 1/1a requirements.

The sampling location for CB3 has a square cross section with internal dimensions of 87.0 x 87.0 inches. The sampling locations are located at 4.6 equivalent diameters downstream from the nearest upstream flow disturbance and at 1.1 equivalent diameters upstream from the nearest downstream flow disturbance or stack exhaust. The stack has six (6) sampling ports oriented in a vertical plane on one side of the duct perpendicular to the gas flow direction. Thirty (30) total sampling points (five points per port), were used for USEPA

Methods 2, 3, 4 and 29 sampling, in accordance with USEPA Method 1 requirements.

3.0 SUMMARY AND DISCUSSION OF TEST RESULTS

3.1 OBJECTIVES

Testing was conducted to the exhaust stack(s) of the carbon bake units CB2 and CB3 to demonstrate compliance with the applicable mercury (Hg) emission standards established in the facility's air permit and 40 CFR Part 63, Subpart LL which limits the emissions of mercury to 1.7 ug/dscm.

As previously indicated, while the CB3's emissions are able to be tested from a single horizontal duct, the Carbon Bake 2's emissions are vented to atmosphere through multiple stacks (16 total). However, it has been determined that sampling four (4) of the sixteen (16) stacks, one test run each, is sufficient to demonstrate compliance. The selected emissions stacks for CB2 which were sampled during this test event included CB2-5, CB2-6, CB2-7, and CB2-8. Due to the multiple stacks tested from CB2, the single-run emissions from each of the stacks are reported both individually and the average emissions reported are based upon volumetric flow rate 'weighting'.

Testing on CB3 was conducted on May 11-12, 2021 while testing on CB2's multiple stacks were conducted on May 11 and 13. CB2 testing was split up into two (2) events so that the necessary sample location access scaffolding could be moved from one set of stacks to the next.

3.2 FIELD TEST CHANGES, PROBLEMS, & ITEMS OF NOTE

The testing was conducted in accordance with the associated Site-Specific Test Protocol submitted to Missouri Department of Natural Resources (MDNR), prior to testing. No problems were encountered during testing that required deviation from the planned test.

3.3 PRESENTATION OF TEST RESULTS

Mercury emission test results are summarized in Table 3-1 below and complete emissions data and parameters are presented in Appendix A. Reduced and tabulated data from the field-testing is included in Appendix B. The calculations and nomenclature used to reduce the data are presented in Appendix C. Actual raw field data sheets are presented in Appendix D. Laboratory reports and custody records are presented in Appendix E.

Equipment calibration information and Gas Calibration Certification sheets are presented in Appendix F. Facility process data, as provided, is included in Appendix G.

TABLE 3-1: Results Summary

Source	Pollutant	Average Measured	Allowable	Units	% of Allowable
CB3	Hg	0.1	1.7	ug/dscm	7%
CB2-5		0.1			7%
CB2-6		0.2			9%
CB2-7		0.2			10%
CB2-8		0.1			8%
CB2 (stack flow weighted avg.)		0.1			8%

3.4 PROCESS MONITORING

All testing was conducted while the applicable sources were operating at or near the peak operating levels. Magnitude 7 Metals ensured all essential process monitoring equipment was operating properly and recording data throughout the test periods. At a minimum, the facility monitored and recorded the following:

1. Scrubber bed pressure drop
2. Bag filter pressure drop
3. Alumina feed rate
4. Air flow rate (SCFM)

This information, as made available, is included in Appendix G.

4.0 SAMPLING AND ANALYTICAL PROCEDURES

Testing was conducted according to the methodology in the *Title 40 Code of Federal Regulation*, Part 60, Appendix A as applicable. The following methods were employed for emission sampling and analyses:

- J EPA Method 1 was used for the qualification of the location of sampling ports and for the determination of the number and positions of stack traverse points, as applicable to sample traverses for Method 2.
- J EPA Method 2 was employed for the determination of the stack gas velocity and volumetric flow rate during stack sampling using the Type "S" Pitot tube.
- J EPA Methods 3 was used for the determination of molecular weight of the stack gases.
- J EPA Method 4 was used for the determination of moisture content.
- J EPA Method 29 was used for the determination of mercury (Hg) concentrations where a minimum of 4 dscfm (141.2 dscf) of emissions gas was sampled per test run.

Emission and process samples were recovered on site in a controlled environment and stored in appropriate storage containers. The liquid level was marked to verify no liquid was lost during transport. Filters were placed and sealed in a Petri dish. All emission, sludge, ash, and service water samples were stored upright in a closed sample box until final laboratory analysis. In order to limit the chain of custody, only essential *AIR* personnel are permitted access to these samples.

5.0 QUALITY ASSURANCE ACTIVITIES

The quality assurance/quality control (QA/QC) measures associated with the sampling and analysis procedures given in the noted EPA reference methodologies, in Subparts A of 40 CFR 60 and 40 CFR 63, and in the *EPA QA/QC Handbook*, Volume III (EPA 600/R-94/038c) were employed, as applicable. Such measures included, but were not limited to, the procedures detailed below.

5.1 PROBE NOZZLE DIAMETER CHECKS

Probe nozzles were calibrated before field testing by measuring the internal diameter of the nozzle entrance orifice along three different diameters. Each diameter was measured to the nearest 0.001 inch, and all measurements were averaged. The diameters were within the limit of acceptable variation of 0.004”.

5.2 PITOT TUBE FACE PLANE ALIGNMENT CHECK

Before field testing, each Type S Pitot tube was examined in order to verify that the face planes of the tube were properly aligned, per Method 2 of 40 CFR 60, Appendix A. The external tubing diameter and base-to-face plane distances were measured in order to verify the use of 0.84 as the baseline (isolated) Pitot coefficient. At that time the entire probe assembly (i.e., the sampling probe, nozzle, thermocouple, and Pitot tube) was inspected in order to verify that its components met the interference-free alignment specifications given in EPA Method 2. Because the specifications were met, then the baseline Pitot coefficient was used for the entire probe assembly.

After field testing, the face plane alignment of each Pitot tube was checked. No damage to the tube orifices was noted.

5.3 METERING SYSTEM CALIBRATION

Every three months each dry gas meter (DGM) console is calibrated at five orifice settings according to Method 5 of 40 CFR 60, Appendix A. From the calibration data, calculations of the values of Y_m and $DH@$ are made, and an average of each set of values is obtained. The limit of total variation of Y_m values is ± 0.02 , and the limit for $DH@$ values is ± 0.20 .

After field testing, the calibration of the DGM console was checked by performing three calibration runs at a single intermediate orifice setting that is representative of the range used during field-testing. Each DGM was within the limit of acceptable relative variation from Y_m of 5.0%.

5.4 TEMPERATURE GAUGE CALIBRATION

After field testing, the temperature measuring instruments on each sampling train was calibrated against standardized mercury-in-glass reference thermometers. Each indicated temperature was within the limit of acceptable variation between the absolute reference temperature and the absolute indicated temperature of 1.5%.

5.5 DATA REDUCTION CHECKS

AIR ran an independent check (using a validated computer program) of the calculations with predetermined data before the field test, and the *AIR* Team Leader conducted spot checks on-site to assure that data was being recorded accurately. After the test, *AIR* checked the data input to assure that the raw data had been transferred to the computer accurately.

5.6 EXTERNAL QUALITY ASSURANCE

5.6.1 TEST PROTOCOL EVALUATION

A Site-Specific Test Protocol was submitted to the Missouri Department of Natural Resources in advance of testing, which provided regulatory personnel the opportunity to review and comment upon the test and quality assurance procedures used in conducting this testing.

5.6.2 ON-SITE TEST EVALUATION

A test schedule was submitted with the Site-Specific Test Protocol. No tests were performed earlier than stated in the original schedule. Therefore, regulatory personnel were afforded the opportunity for on-site evaluation of all test procedures.

6.0 DATA QUALITY OBJECTIVES

The data quality objectives (DQOs) process is generally a seven-step iterative planning approach to ensure development of sampling designs for data collection activities that support decision making. The seven steps are as follows: (1) defining the problem; (2) stating decisions and alternative actions; (3) identifying inputs into the decision; (4) defining the study boundaries; (5) defining statistical parameters, specifying action levels, and developing action logic; (6) specifying acceptable error limits; and (7) selecting resource-effective sampling and analysis plan to meet the performance criteria. The first five steps are primarily focused on identifying qualitative criteria such as the type of data needed and defining how the data will be used. The sixth step defines quantitative criteria and the seventh step is used to develop a data collection design. In regards to emissions sampling, these steps have already been identified for typical monitoring parameters.

Monitoring methods presented in 40 CFR 60 indicate the following regarding DQOs: Adherence to the requirements of this method will enhance the quality of the data obtained from air pollutant sampling methods. At a minimum, each method provides the following types of information: summary of method; equipment and supplies; reagents and standards; sample collection, preservation, storage, and transportation; quality control; calibration and standardization; analytical procedures, data analysis and calculations; and alternative procedures. These test methods have been designed and tested according to DQOs for emissions testing and analysis.

APPENDIX A

TEST RESULTS

Advanced Industrial Resources, Inc

Magnitude 7 Metals

TABLE 3-1: Results Summary

Source	Pollutant	Average Measured	Allowable	Units	% of Allowable
CB3	Hg	0.1	1.7	ug/dscm	7%
CB2-5		0.1			7%
CB2-6		0.2			9%
CB2-7		0.2			10%
CB2-8		0.1			8%
CB2 (weighted avg.)		0.1			8%

Advanced Industrial Resources, Inc.

Test Results - Mercury

Magnitude 7 Metals

Marston, Missouri

Carbon Bake 2 - Stacks 5, 6, 7, & 8

Notes:

1) Average emissions reported are based on volumetric flow rate 'weighting'

	Units	CB2-5	CB2-6	CB2-7	CB2-8	Averages
Test Date		11-May-21	11-May-21	13-May-21	13-May-21	
Start Time		7:15	12:15	7:30	11:20	
End Time		10:18	15:33	10:35	14:24	
P_m	Pressure of meter gases	inches Hg	30.14	30.14	30.30	30.32
P_s	Pressure of stack gases	inches Hg	29.94	29.97	30.15	30.14
V_{m(std)}	Volume of gas sample	dscf	145.07	140.65	133.19	140.69
V_{w(std)}	Volume of water vapor	scf	1.65	1.37	1.51	1.51
B_{ws}	Moisture in stack gas	dimensionless	0.011	0.010	0.011	0.011
B_{ws,theo}	Theoretical max. moisture		0.950	0.946	0.341	0.844
B_{ws,act}	Actual moisture		0.011	0.010	0.011	0.011
M_d	Mol. Wt. Of gas at DGM	lb./lb.-mole	28.86	28.84	28.83	28.84
M_s	Mol. Wt. Of gas at stack	lb./lb.-mole	28.74	28.73	28.71	28.73
v_s	Velocity of stack gas	ft./sec	70.10	68.90	67.71	70.68
A_n	Area of nozzle	ft ²	0.000241	0.000241	0.000218	0.000241
A_s	Area of stack	ft ²	0.75	0.75	0.75	0.75
Gas Stream Flow Rates						
Q_a	Vol. Flow rate of actual gas	cfm	3,167	3,113	3,059	3,193
Q_w	Vol. Flow rate of wet gas	scfm	2,497	2,457	2,613	2,556
Q_{sd}	Vol. Flow rate of dry gas	dscfm	2,469	2,433	2,584	2,529
I	Isokinetic sampling ratio	percent	102.2	100.5	98.8	96.8
Gas Stream Mercury Concentrations						
Volumetric Flow rate weighted Averages						
c_{Hg}	Conc. Of Hg in dry stack gas	ug/dscm	0.1	0.2	0.2	0.1
E_{Hg All}	Allowable Hg Emission Rate	ug/dscm	1.7	1.7	1.7	1.7
% of All	% of Allowable	%	7%	9%	10%	8%
c_{Hg}	Conc. Of Hg in dry stack gas	mg/dscm	1.18E-04	1.54E-04	1.66E-04	1.36E-04
c_{Hg}	Conc. Of Hg in dry stack gas	10 ⁻⁶ gr/dscf	0.051	0.067	0.072	0.060
Mercury Mass Rates						
E_{Hg}	Emission rate of Hg	lb/hour	1.1E-06	1.4E-06	1.6E-06	1.3E-06
						NA

Advanced Industrial Resources, Inc.

Test Results - PM & Metals

Magnitude 7 Metals
Marston, Missouri
Carbon Bake 3

Notes:

1) tpy - tons per year - based on continuous operation or 8760 hours per year

		Units	Run 1	Run 2	Run 3	Averages
Test Date			11-May-21	12-May-21	12-May-21	
Start Time			11:05	7:55	11:25	
End Time			14:15	11:03	14:32	
P_m	Pressure of meter gases	inches Hg	30.16	30.17	30.17	30.17
P_s	Pressure of stack gases	inches Hg	30.01	30.01	30.01	30.01
V_{m(std)}	Volume of gas sample	dscf	150.14	151.51	151.27	150.97
V_{w(std)}	Volume of water vapor	scf	1.04	1.32	1.37	1.24
B_{ws}	Moisture in stack gas	dimensionless	0.007	0.009	0.009	0.008
B_{ws,theo}	Theoretical max. moisture		0.270	0.307	0.412	0.330
B_{ws,act}	Actual moisture		0.007	0.009	0.009	0.008
M_d	Mol. Wt. Of gas at DGM	lb./lb.-mole	28.85	28.85	28.84	28.85
M_s	Mol. Wt. Of gas at stack	lb./lb.-mole	28.78	28.76	28.75	28.76
v_s	Velocity of stack gas	ft./sec	20.32	20.80	21.08	20.73
A_n	Area of nozzle	ft ²	0.000808	0.000808	0.000808	0.000808
A_s	Area of stack	ft ²	52.56	52.56	52.56	52.56
Gas Stream Flow Rates						
Q_a	Vol. Flow rate of actual gas	cfm	64,084	65,588	66,486	65,386
Q_w	Vol. Flow rate of wet gas	scfm	55,374	56,179	55,805	55,786
Q_{sd}	Vol. Flow rate of dry gas	dscfm	54,993	55,693	55,304	55,330
I	Isokinetic sampling ratio	percent	98.6	98.3	98.8	98.6
Gas Stream Mercury Concentrations						
c_{Hg}	Conc. Of Hg in dry stack gas	ug/dscm	0.1	0.1	0.1	0.1
E_{Hg All}	Allowable Hg Emission Rate	ug/dscm	1.7	1.7	1.7	1.7
% of All	% of Allowable	%	6%	6%	8%	7%
c_{Hg}	Conc. Of Hg in dry stack gas	mg/dscm	1.1E-04	1.0E-04	1.3E-04	1.1E-04
c_{Hg}	Conc. Of Hg in dry stack gas	10 ⁻⁶ gr/dscf	0.046	0.045	0.056	0.049
Mercury Mass Rates						
E_{Hg}	Emission rate of Hg	lb/hour	2.2E-05	2.2E-05	2.7E-05	2.3E-05
		tpy ¹	9.5E-05	9.5E-05	1.2E-04	1.0E-04

APPENDIX B

FIELD DATA REDUCTION

Advanced Industrial Resources, Inc.

Data Reduction Sheet

Client:	Magnitude 7 Metals	Console ID:	CB2-5 C-13	CB2-6 C-13	CB2-7 C-013	CB2-8 C-013
Location:	Marston, Missouri	Y_m :	0.901	0.901	0.901	0.901
Source:	Carbon Bake 2 - Stacks 5, 6, 7, & 8	$\Delta H_{@}$:	1.737	1.737	1.737	1.737
Test Team:	GE, LS, KF	C_p :		0.84		
EPA Methods:	1, 2, 3A, 4, 29	Analyte(s):		Hg		

		Units	CB2-5	CB2-6	CB2-7	CB2-8
Test Date			11-May-21	11-May-21	13-May-21	13-May-21
Start Time			7:15	12:15	7:30	11:20
End Time			10:18	15:33	10:35	14:24
V_m	Volume of gas sample	dcf	159.741	157.827	149.745	158.799
M_{lc}	Mass of liquid collected	g	34.9	28.9	31.9	31.9
Δp	Velocity head of stack gas	inches H ₂ O	1.225	1.185	1.250	1.263
$(\Delta p)^{1/2}$	Square root of velocity head	(inches H ₂ O) ^{1/2}	1.106	1.088	1.112	1.123
ΔH	Pressure differential	inches H ₂ O	1.96	1.90	1.75	2.02
θ	Total sampling time	minutes	180.0	180.0	180.0	180.0
D_n	Diameter of nozzle	inches	0.210	0.210	0.200	0.210
D_s	Diameter of stack	inches	11.8	11.8	11.8	11.8
T_m	Temperature of meter	°R	528	538	542	544
T_s	Temperature of stack gas	°R	670	670	623	665
P_{bar}	Barometric pressure	inches Hg	30.00	30.00	30.17	30.17
p_g	Gauge pressure of stack gas	inches H ₂ O	-0.80	-0.38	-0.24	-0.36
% O ₂	Percent O ₂ by volume	percent (v/v)	19.400	19.540	19.470	19.670
% CO ₂	Percent CO ₂ by volume	percent (v/v)	0.510	0.350	0.310	0.200
% N ₂	Percent N ₂ by volume	percent (v/v)	80.1	80.1	80.2	80.1
m_{Hg}	Mass of mercury	ug	0.48	0.612	0.63	0.54
m_{Hg}	Mass of mercury	mg	0.00048	0.000612	0.00063	0.00054

Advanced Industrial Resources, Inc.

Data Reduction Sheet

Client:	Magnitude 7 Metals	Console ID:	C-015
Location:	Marston, Missouri	Y_m:	0.992
Source:	Carbon Bake 3	ΔH_@:	1.763
Test Team:	GE, LS, KF	C_p:	0.84
EPA Methods:	1, 2, 3A, 4, 29	Analyte(s):	Hg

		Units	Run 1	Run 2	Run 3
Test Date			11-May-21	12-May-21	12-May-21
Start Time			11:05	7:55	11:25
End Time			14:15	11:03	14:32
V_m	Volume of gas sample	dcf	153.776	153.107	155.299
M_{lc}	Mass of liquid collected	g	22.0	27.9	28.9
Δp	Velocity head of stack gas	inches H ₂ O	0.115	0.119	0.119
(Δp)^{1/2}	Square root of velocity head	(inches H ₂ O) ^{1/2}	0.336	0.342	0.343
ΔH	Pressure differential	inches H ₂ O	2.21	2.28	2.29
θ	Total sampling time	minutes	180.0	180.0	180.0
D_n	Diameter of nozzle	inches	0.385	0.385	0.385
D_s	Diameter of stack	inches	87.0 x 87.0	87.0 x 87.0	87.0 x 87.0
T_m	Temperature of meter	°R	541	534	542
T_s	Temperature of stack gas	°R	613	618	631
P_{bar}	Barometric pressure	inches Hg	30.00	30.00	30.00
p_g	Gauge pressure of stack gas	inches H ₂ O	0.08	0.08	0.08
% O₂	Percent O ₂ by volume	percent (v/v)	19.700	19.380	19.380
% CO₂	Percent CO ₂ by volume	percent (v/v)	0.400	0.470	0.420
% N₂	Percent N ₂ by volume	percent (v/v)	79.9	80.2	80
m_{Hg}	Mass of mercury	ug	0.45	0.444	0.55
m_{Hg}	Mass of mercury	mg	0.00045	0.000444	0.0005

Advanced Industrial Resources, Inc.

Sample Calculation Sheet (Hg, CO)

Magnitude 7 Metals, Marston, Missouri

Carbon Bake 2 - 5, Run #1

Area of nozzle:

$$A_n = 3.1415 \times D_n^2 / 4 / 144 \text{ in}^2/\text{ft}^2$$

$$A_n = 3.1415 \times (0.21) \times (0.21) / 4 / 144$$

$$A_n = 0.000241 \text{ ft}^2$$

Area of stack:

$$A_s = 3.1415 \times D_s^2 / 4 / 144 \text{ in}^2/\text{ft}^2$$

$$A_s = 3.1415 \times (11.75) \times (11.75) / 4 / 144$$

$$A_s = 0.75 \text{ ft}^2$$

Absolute pressure of meter gases:

$$P_m = P_{\text{bar}} + \Delta H / 13.6$$

$$P_m = 30 + 1.96 / 13.6$$

$$P_m = 30.14 \text{ inches Hg}$$

Absolute pressure of stack gases:

$$P_s = P_{\text{bar}} + P_g / 13.6$$

$$P_s = 30 + -0.8 / 13.6$$

$$P_s = 29.94 \text{ inches Hg}$$

Volume of gas sample, standardized:

$$V_{m(\text{std})} = V_m \times Y_m (T_{\text{std}} / T_m) (P_m / P_{\text{std}})$$

$$V_{m(\text{std})} = (159.741) \times (0.901) \times (528/527.75) \times (30.14/29.92)$$

$$V_{m(\text{std})} = 145.05 \text{ dscf}$$

Volume of water vapor in the gas sample, standardized:

$$V_{w(\text{std})} = (V_{\text{lc}} \times p_w \times R \times T_{\text{std}}) / (M_w \times P_{\text{std}})$$

$$V_{w(\text{std})} = (35) \times (0.002201) \times (21.85) \times (528) / (18 \times 29.92)$$

$$V_{w(\text{std})} = 1.65 \text{ scf}$$

Volume proportion of water in the stack gas stream:

$$B_{ws} = V_{w(\text{std})} / (V_{m(\text{std})} + V_{w(\text{std})})$$

$$B_{ws} = (1.65 / (145.05 + 1.65))$$

$$B_{ws} = 0.0112$$

Volume proportion of water in the stack gas stream, theoretical maximum:

$$B_{ws,\text{theo}} = 10^{\{6.37-2827/(T_s - 95.2)\}} / P_s$$

$$B_{ws,\text{theo}} = 10^{\{6.37-2827/(670.25 - 95.2)\}} / 29.94$$

$$B_{ws,\text{theo}} = 0.9498$$

Advanced Industrial Resources, Inc.

Sample Calculation Sheet (Hg, CO)

Magnitude 7 Metals, Marston, Missouri

Carbon Bake 2 - 5, Run #1

Volume proportion of water in the stack gas stream:

$$B_{ws,act} = \text{lower of } B_{ws,meas} \text{ and } B_{ws,theo}$$

$$B_{ws,act} = 0.0112$$

Theoretical maximum moisture collection at saturation:

$$V_{lc,theo} = V_{m(std)} \times B_{ws,theo} / (1 - B_{ws,theo}) / 0.04707$$

$$V_{lc,theo} = (145.05 \times 0.9498) / (1 - 0.9498) / 0.04707$$

$$V_{lc,theo} = 58304.5$$

Nitrogen content of gas at the DGM:

$$\% N_2 = 100\% - \% CO_2 - \% O_2 - \% CO$$

$$\% N_2 = 100\% - 0.51\% - 19.4\% - 0\%$$

$$\% N_2 = 80.1 \quad \%$$

Molecular weight of gas at the DGM:

$$M_d = ((44 \times \% CO_2) + (32 \times \% O_2) + (28 \times (\% N_2 + \% CO))) / 100\%$$

$$M_d = ((44 \times 0.51) + (32 \times 19.4) + (28 (80.1 + 0))) / 100\%$$

$$M_d = 28.86 \quad \text{lb/lb-mole}$$

Molecular weight of gas at the stack:

$$M_s = M_d (1 - B_{ws}) + M_w \times B_{ws}$$

$$M_s = (28.86 \times (1 - 0.0112)) + (18 \times 0.0112)$$

$$M_s = 28.74 \quad \text{lb/lb-mole}$$

Velocity of stack gas:

$$v_s = K_p \times C_p [\Delta p]^{1/2} \times [T_s / (P_s M_s)]^{1/2}$$

$$v_s = (85.49 \times 0.84 \times (1.225)^{1/2} \times [670.25 / (29.94 \times 28.74)])^{1/2}$$

$$v_s = 70.15 \quad \text{ft/s}$$

Volumetric flow rate of actual stack gas:

$$Q_a = v_s \times A_s \times 60 \text{ sec/min}$$

$$Q_a = (70.15) \times (0.752992) \times (60 \text{ sec/min})$$

$$Q_a = 3169 \quad \text{cfm}$$

Volumetric flow rate of dry stack gas, standardized:

$$Q_{sd} = (60 \text{ sec/min}) \times (1 - B_{ws}) v_s A_s (T_{std} / T_s) \times (P_s / P_{std})$$

$$Q_{sd} = (60 \text{ sec/min}) \times (1 - 0.0112) \times 70.15 \times 0.752992 \times (528 / 670.25) \times (29.94 / 29.92)$$

$$Q_{sd} = 2470 \quad \text{dscfm}$$

Isokinetic sampling ratio expressed as percentage:

$$I = 100 T_s [(K_3 \times V_{lc}) + (Y_m \times V_m \times P_m / T_m)] / (60 \times Q \times v_s \times P_s \times A_n)$$

$$I = 100 \times (670.25) \times ((0.002669 \times 35) + (0.901 \times 159.741 \times 30.14 / 527.75)) / (60 \times 180 \times 70.15 \times 29.94 \times 0.000241)$$

$$I = 101.9 \quad \%$$

Advanced Industrial Resources, Inc.

Sample Calculation Sheet (Hg, CO)

Magnitude 7 Metals, Marston, Missouri

Carbon Bake 2 - 5, Run #1

Concentration of Hg in dry stack gas, standardized:

$$c = (m / V_{m(\text{std})}) (35.32 \text{ ft}^3 / \text{m}^3)$$

$$c = (0.000483 / 145.05) \times 35.32$$

$$c = \mathbf{0.000118 \text{ mg/dscm}}$$

$$c = \mathbf{0.118 \text{ ug/dscm}}$$

Concentration of Hg in dry stack gas, standardized:

$$c = (\text{mg/dscm}) / (35.32 \text{ ft}^3 / \text{m}^3) / (64.8 \text{ mg/gr}) \times 1000000$$

$$c = (0.000118) / 35.32 / 64.8 \times 1000000$$

$$c = \mathbf{0.052 \times 10^{-6} \text{ gr/dscf}}$$

Emission rate of Hg, time basis:

$$E = c_{\text{mg/dscm}} \times Q_{\text{sd}} \times (60 \text{ min/hr}) \times (2.2046 \times 10^{-6} \text{ lb/mg}) / (35.32 \text{ ft}^3 / \text{m}^3)$$

$$E = 0.000118 \times 2470 \times 60 \times 2.2046 \times 10^{-6} / 35.32$$

$$E = \mathbf{0.000001 \text{ lb/hr}}$$

Advanced Industrial Resources, Inc.

Sample Calculation Sheet (Hg, CO)

Magnitude 7 Metals, Marston, Missouri

Carbon Bake 3, Run #1

Area of nozzle:

$$A_n = 3.1415 \times D_n^2 / 4 / 144 \text{ in}^2/\text{ft}^2$$

$$A_n = 3.1415 \times (0.385) \times (0.385) / 4 / 144$$

$$A_n = 0.000808 \text{ ft}^2$$

Area of stack:

$$A_s = L \times W / 144 \text{ in}^2/\text{ft}^2$$

$$A_s = 87 \times 87 / 144$$

$$A_s = 52.56 \text{ ft}^2$$

Absolute pressure of meter gases:

$$P_m = P_{bar} + \Delta H / 13.6$$

$$P_m = 30 + 2.20685 / 13.6$$

$$P_m = 30.16 \text{ inches Hg}$$

Absolute pressure of stack gases:

$$P_s = P_{bar} + P_g / 13.6$$

$$P_s = 30 + 0.08 / 13.6$$

$$P_s = 30.01 \text{ inches Hg}$$

Volume of gas sample, standardized:

$$V_{m(std)} = V_m \times Y_m (T_{std} / T_m) (P_m / P_{std})$$

$$V_{m(std)} = (153.776) \times (0.992) \times (528/540.8) \times (30.16/29.92)$$

$$V_{m(std)} = 150.13 \text{ dscf}$$

Volume of water vapor in the gas sample, standardized:

$$V_{w(std)} = (V_{lc} \times p_w \times R \times T_{std}) / (M_w \times P_{std})$$

$$V_{w(std)} = (22) \times (0.002201) \times (21.85) \times (528) / (18 \times 29.92)$$

$$V_{w(std)} = 1.04 \text{ scf}$$

Volume proportion of water in the stack gas stream:

$$B_{ws} = V_{w(std)} / (V_{m(std)} + V_{w(std)})$$

$$B_{ws} = (1.04 / (150.13 + 1.04))$$

$$B_{ws} = 0.0069$$

Volume proportion of water in the stack gas stream, theoretical maximum:

$$B_{ws, theo} = 10^{\{6.37-2827/(T_s - 95.2)\}} / P_s$$

$$B_{ws, theo} = 10^{\{6.37-2827/(612.8 - 95.2)\}} / 30.01$$

$$B_{ws, theo} = 0.2698$$

Advanced Industrial Resources, Inc.

Sample Calculation Sheet (Hg, CO)

Magnitude 7 Metals, Marston, Missouri

Carbon Bake 3, Run #1

Volume proportion of water in the stack gas stream:

$B_{ws,act} = \text{lower of } B_{ws,\text{meas}} \text{ and } B_{ws,\text{theo}}$

$B_{ws,act} = 0.0069$

Theoretical maximum moisture collection at saturation:

$$V_{lc,\text{theo}} = V_{m(\text{std})} \times B_{ws,\text{theo}} / (1 - B_{ws,\text{theo}}) / 0.04707$$

$$V_{lc,\text{theo}} = (150.13 \times (0.2698)) / (1 - 0.2698) / 0.04707$$

$$V_{lc,\text{theo}} = 1178.5$$

Nitrogen content of gas at the DGM:

$$\% N_2 = 100\% - \% CO_2 - \% O_2 - \% CO$$

$$\% N_2 = 100\% - 0.4\% - 19.7\% - 0\%$$

$$\% N_2 = 79.9 \quad \%$$

Molecular weight of gas at the DGM:

$$M_d = ((44 \times \% CO_2) + (32 \times \% O_2) + (28 \times (\% N_2 + \% CO))) / 100\%$$

$$M_d = ((44 \times 0.4) + (32 \times 19.7) + (28 (79.9 + 0))) / 100\%$$

$$M_d = 28.85 \quad \text{lb/lb-mole}$$

Molecular weight of gas at the stack:

$$M_s = M_d (1 - B_{ws}) + M_w \times B_{ws}$$

$$M_s = (28.85 \times (1 - 0.0069)) + (18 \times 0.0069)$$

$$M_s = 28.78 \quad \text{lb/lb-mole}$$

Velocity of stack gas:

$$v_s = K_p \times C_p [\Delta p]^{1/2} \times [T_s / (P_s M_s)]^{1/2}$$

$$v_s = (85.49 \times 0.84 \times (0.115)^{1/2} \times [612.8 / (30.01 \times 28.78)])^{1/2}$$

$$v_s = 20.51 \quad \text{ft/s}$$

Volumetric flow rate of actual stack gas:

$$Q_a = v_s \times A_s \times 60 \text{ sec/min}$$

$$Q_a = (20.51) \times (52.5625) \times (60 \text{ sec/min})$$

$$Q_a = 64683 \quad \text{cfm}$$

Volumetric flow rate of dry stack gas, standardized:

$$Q_{sd} = (60 \text{ sec/min}) \times (1 - B_{ws}) v_s A_s (T_{std} / T_s) \times (P_s / P_{std})$$

$$Q_{sd} = (60 \text{ sec/min}) \times (1 - 0.0069) \times 20.51 \times 52.5625 \times (528 / 612.8) \times (30.01 / 29.92)$$

$$Q_{sd} = 55514 \quad \text{dscfm}$$

Isokinetic sampling ratio expressed as percentage:

$$I = 100 T_s [(K_3 \times V_{lc}) + (Y_m \times V_m \times P_m / T_m)] / (60 \times Q \times v_s \times P_s \times A_n)$$

$$I = 100 \times (612.8) \times ((0.002669 \times 22) + (0.992 \times 153.776 \times 30.16 / 540.8)) / (60 \times 180 \times 20.51 \times 30.01 \times 0.000808)$$

$$I = 97.7 \quad \%$$

Advanced Industrial Resources, Inc.

Sample Calculation Sheet (Hg, CO)

Magnitude 7 Metals, Marston, Missouri

Carbon Bake 3, Run #1

Concentration of Hg in dry stack gas, standardized:

$$c = (m / V_{m(\text{std})}) (35.32 \text{ ft}^3 / \text{m}^3)$$

$$c = (0.000447 / 150.13) \times 35.32$$

$$c = \mathbf{0.000105 \text{ mg/dscm}}$$

Concentration of Hg in dry stack gas, standardized:

$$c = (\text{mg/dscm}) / (35.32 \text{ ft}^3 / \text{m}^3) / (64.8 \text{ mg/gr}) \times 1000000$$

$$c = (0.000105) / 35.32 / 64.8 \times 1000000$$

$$c = \mathbf{0.046 \text{ } 10^{-6} \text{ gr/dscf}}$$

Emission rate of Hg, time basis:

$$E = c_{\text{mg/dscm}} \times Q_{\text{sd}} \times (60 \text{ min/hr}) \times (2.2046 \times 10^{-6} \text{ lb/mg}) / (35.32 \text{ ft}^3 / \text{m}^3)$$

$$E = 0.000105 \times 55514 \times 60 \times 2.2046 \times 10^{-6} / 35.32$$

$$E = \mathbf{0.000022 \text{ lb/hr}}$$

APPENDIX C

EXAMPLE CALCULATIONS &

NOMENCLATURE

EXAMPLE CALCULATIONS

$$A_n = D_n^2 \Leftrightarrow 4$$

$$A_s = D_s^2 \Leftrightarrow 4$$

$$B_{ws} = V_{w(std)} / (V_{m(std)} + V_{w(std)})$$

$$c_{analyte} = (m_{analyte} / V_{m(std)}) (35.31466 \text{ ft}^3/\text{m}^3)$$

$$'c_{analyte} = (m_{analyte} / V_{m(std)}) (0.015432 \text{ gr/mg})$$

$$c_{analyte} = 'c_{analyte} MW_{analyte} / 24.04 \text{ l/mol}$$

$$CC = t_{0.975} (S_d / n^{1/2})$$

$$d = 1/n (Sd_i)$$

$$DE = (E_{Inlet} - E_{Outlet}) / E_{Inlet} \times 100\%$$

$$E_{analyte} = (m_{analyte} / V_{m(std)}) Q_{sd} (60 \text{ min/hr}) (2.2046 \times 10^{-6} \text{ lb./mg})$$

$$E_{analyte} = c_{analyte} Q_{sd} (60 \text{ min/hr}) (2.2046 \times 10^{-6} \text{ lb./mg})$$

$$I = 100 T_s (K_3 V_{lc} + Y_m V_m P_m / T_m) / (60 \forall v_s P_s A_n)$$

$$\text{where } K_3 = 0.002669 \text{ (in. Hg ft}^3\text{) / (mL [R])}$$

$$K_I = [(2.0084 \times 10^7 \zeta H_{@}) A_n (1 - B_{ws})]^2 (M_d / M_s) (T_m / T_s) (P_s / P_m)$$

$$M_d = 0.44 (\% CO_2) + 0.32 (\% O_2) + 0.28 (\% N_2 + \% CO)$$

$$M_s = M_d (1 - B_{ws}) + M_w B_{ws}$$

$$P = Q_{sd} / F\text{-Factor} \times 60 \times (20.9 - O_2) / 20.9$$

$$P_m = P_{bar} + \zeta H / 13.6$$

$$P_s = P_{bar} + p_g / 13.6$$

$$Q_a = (60 \text{ s/min}) v_s A_s$$

$$Q_{sd} = (60 \text{ s/min}) (1 - B_{ws}) v_s A_s (T_{std} / T_s) (P_s / P_{std})$$

$$RA = [Abs(d) + Abs(CC)]/RM$$

$$S_d = [(Sd_i^2 - (Sd_i)^2/n)/(n-1)]^{1/2}$$

$$T_m = t_m + 460 \lceil$$

$$T_s = t_s + 460 \lceil$$

$$V_{m(std)} = V_m Y_m (T_{std} / T_m) (P_m / P_{std})$$

$$V_{w(std)} = (V_{lc} \partial_w R T_{std}) / (M_w P_{std})$$

$$v_s = K_p C_p [\zeta p]^{1/2} [T_s / (P_s M_s)]^{1/2}$$

NOMENCLATURE

Symbol	Units	Description
Abs(x)	dimensionless	Absolute value of parameter x
A_n	ft ²	Area of the nozzle
A_s	ft ²	Area of the stack
B_{ws}	dimensionless	Volume proportion of water in the stack gas stream
C_p	dimensionless	Type S pitot tube coefficient
c_{analyte}	mg/dscm	Concentration of analyte in dry stack gas, standardized
'c_{analyte}	gr./dscf	Concentration of analyte in dry stack gas, standardized
'c'_{analyte}	ppm	Concentration of analyte in dry stack gas, standardized
CC	dimensionless	One-tailed 2.5% error confidence coefficient
d	ppm	Arithmetic mean of differences
d_i	ppm	Difference between individual CEM and reference method concentration value
D_n	inches	Internal diameter of the nozzle at the entrance orifice
D_s	inches	Internal diameter of the stack at sampling location
DE	percent	Destruction efficiency
UH	inches H ₂ O	Average pressure differential across the meter orifice
UH@	inches H ₂ O	Orifice pressure differential that corresponds to 0.75 cfm of air at 68 °F and 29.92 inches of Hg
Up	inches H ₂ O	Velocity head of stack gas
E_{analyte}	lb./hour	Emission rate of analyte, time basis
I	percent	Isokinetic sampling ratio expressed as percentage
K_I	dimensionless	K-factor, ratio of DH to DP, ideal
K_p	ft[(lb/lb-mol)(in. Hg)] ^{1/2}	Type S pitot tube constant,
	s[(°R)(in. H ₂ O)] ^{1/2}	= 85.49
L_p	cfm	Measured post-test leakage rate of the sampling train
M_d	lb./lb.-mole	Molecular weight of gas at the DGM
M_s	lb./lb.-mole	Molecular weight of gas at the stack

NOMENCLATURE

Symbol	Units	Description
M_w	lb./lb.-mole	Molecular weight of water,
		= 18.0
m_{analyte}	mg	Mass of analyte in the sample
n	dimensionless	Number of data points
P	MMBtu	Fuel firing rate
P_{bar}	inches Hg	Barometric pressure at measurement site
P_{input}	tons/hour	Process dry mass input rate
p_g	inches H ₂ O	Gauge (static) pressure of stack gas
P_m	inches Hg	Absolute pressure of meter gases
P_s	inches Hg	Absolute pressure of stack gases
P_{std}	inches Hg	Standard absolute pressure
		= 29.92
Q_a	cfm	Volumetric flow rate of actual stack gas
Q_{sd}	dscfm	Volumetric flow rate of dry stack gas, standardized
R	(in. Hg)(ft ³)	Ideal gas constant,
	(lb-mole)(°R)	= 21.85
RA	percent	Relative accuracy
RE	percent	Removal efficiency
RM	ppm	Average reference method concentration
r_w	lb/mL	Density of water,
		= 0.002201
r_a	g/mL	Density of acetone,
		= 0.7899
S_d	dimensionless	Standard deviation
T_m	°R	Absolute temperature of dry gas meter
T_s	°R	Absolute temperature of stack gas
T_{std}	°R	Standard absolute temperature,
		= 528
t_{0.975}	dimensionless	2.5 percent error t-value
t_m	°F	Temperature of DGM
t_s	°F	Temperature of stack gas
„1	minutes	Total sampling time

NOMENCLATURE

Symbol	Units	Description
V_{lc}	mL	Total volume of liquid collected
V_m	dcf	Volume of gas sample as measured by the DGM
$V_{m(std)}$	dscf	Volume of gas sample as measured by the DGM, standardized
$V_{w(std)}$	scf	Volume of water vapor in the gas sample, standardized
v_s	ft./sec	Velocity of stack gas
Y_m	dimensionless	DGM calibration coefficient
Y_c	dimensionless	DGM calibration check value
Y_w	dimensionless	Reference (wet) gas meter calibration coefficient
% CO ₂	percent	Percent CO ₂ by volume, dry basis
% O ₂	percent	Percent O ₂ by volume, dry basis
% N ₂	percent	Percent N ₂ by volume, dry basis

APPENDIX D

FIELD DATA

SEE ATTACHED CD FOR COMPLETE MONITOR DATA

CARBON BAKE 2 - 5



SOURCE NAME Magnitude 7 Metals			OBSERVATION DATE 5-11-21	START TIME 8:22			STOP TIME 8:37					
ADDRESS 391 St. Jude Industrial Park			SEC MIN	0	15	30	45	SEC MIN	0	15	30	45
P.O. Box 395			1	0	0	0	0	31				
			2	0	0	0	0	32				
CITY Marston STATE MO ZIP 63866			3	0	0	0	0	33				
PHONE 573-643-0023 SOURCE ID NUMBER EP99			4	0	0	0	0	34				
PROCESS EQUIPMENT Carbon Bake #5 OPERATING MODE Normal			5	0	0	0	0	35				
CONTROL EQUIPMENT Scrubber + Baghouse Normal			6	0	0	0	0	36				
DESCRIBE EMISSION POINT			7	0	0	0	0	37				
START Multiple			8	0	0	0	0	38				
HEIGHT ABOVE GROUND LEVEL 50 HEIGHT RELATIVE TO OBSERVER START 50 STOP			9	0	0	0	0	39				
DISTANCE FROM OBSERVER START 500 STOP DIRECTION FROM OBSERVER START NW STOP			10	0	0	0	0	40				
DESCRIBE EMISSIONS			11	0	0	0	0	41				
START STOP			12	0	0	0	0	42				
EMISSION COLOR START STOP PLUME TYPE: CONTINUOUS <input type="checkbox"/> FUGITIVE <input type="checkbox"/> INTERMITTENT <input type="checkbox"/>			13	0	0	0	0	43				
WATER DROPLETS PRESENT: NO <input type="checkbox"/> YES <input checked="" type="checkbox"/> IF WATER DROPLET PLUME: ATTACHED <input type="checkbox"/> DETACHED <input type="checkbox"/>			14	0	0	0	0	44				
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED			15	0	0	0	0	45				
START STOP			16					46				
DESCRIBE BACKGROUND			17					47				
START Blue Sky STOP			18					48				
BACKGROUND COLOR START Blue Sky STOP SKY CONDITIONS START Blue Sky STOP			19					49				
WIND SPEED START 10 mph STOP WIND DIRECTION START NE STOP			20					50				
AMBIENT TEMP START 55°F STOP WET BULB TEMP RH.percent			21					51				
Source Layout Sketch			22					52				
			23					53				
			24					54				
			25					55				
			26					56				
			27					57				
			28					58				
			29					59				
			30					60				
AVERAGE OPACITY FOR HIGHEST PERIOD			NUMBER OF READINGS ABOVE 26 % WERE 0									
RANGE OF OPACITY READINGS MINIMUM 0 MAXIMUM 0												
OBSERVER'S NAME (PRINT) Alicia Powell												
COMMENTS Mercury + PFC "Air" Testing			OBSERVER'S SIGNATURE Alicia Powell			DATE 5-11-21						
NH			ORGANIZATION Magnitude 7 Metals									
I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS SIGNATURE			CERTIFIED BY:			DATE						
TITLE			DATE			VERIFIED BY:			DATE			

Advanced Industrial Resources, Inc.

Field Data Sheet

Client:	Magnitude 7 Metals	Test Date:	May 11, 2021
Location:	Marston, Missouri	Console ID:	C-13
Source:	Carbon Bake 2 - 5	Y_m / ΔH_@:	0.901 1.737
Test Team:	GE, LS, KF	Sampling Box ID:	B-13
EPA Methods:	1, 2, 3A, 4, 29	Probe Assembly ID:	P3-02
D _s (in.):	11.75	D _n (in.):	0.210
% O ₂	19.4	Assumed B _{ws} :	3.0
% CO ₂	0.51	P _{bar} (in. Hg):	30.00
Start Run:	7:15 AM	p _g (in. H ₂ O):	-0.80
End Run:	10:18 AM	Minutes/Point:	22.5
Run Number:	1	K-Factor:	1.6

Point	Meter (dcf)	Inches H ₂ O		(Δp) ^{1/2}	Temperature Readings (°F)				
		Δp	ΔH		t _s	Probe	Filter	Last Impinger	t _m
1	517.919	1.20	1.92	1.095	211	258	247	61	60
2	536.72	1.20	1.92	1.095	208	246	256	57	61
3	555.31	1.30	2.08	1.140	210	248	260	60	67
4	575.94	1.10	1.76	1.049	210	244	258	62	70
5	596.51	1.20	1.92	1.095	207	239	249	60	71
6	617.35	1.30	2.08	1.140	212	247	256	63	69
7	638.04	1.40	2.24	1.183	214	255	250	65	72
8	660.26	1.10	1.76	1.049	210	250	254	60	72
End	677.660								3

Total Moisture Collected (mL): 35.0
 Theoretical maximum moisture collection at saturation (ml): 58326.5
 Pre System Leak Check (cfm): 0.002
 Post System Leak Check (cfm): 0.002

Test Run 1 Begin. STRATA Version 3.2.112

Operator: Greg Essig

Plant Name: Magnitude 7 Metals

Location: Marston, MO. CB2-5

	O2	CO2	O2	CO2	
	%	%	Volts	Volts	
5/11/2021	10:33:53	19.31	0.568	7.747	0.305
5/11/2021	10:35:42	19.311	0.556	7.748	0.299
5/11/2021	10:36:42	19.313	0.556	7.748	0.299
5/11/2021	10:37:40	19.324	0.548	7.753	0.295
5/11/2021	10:38:40	19.332	0.56	7.756	0.301
5/11/2021	10:39:42	19.343	0.54	7.76	0.291
5/11/2021	10:40:42	19.349	0.547	7.763	0.294
5/11/2021	10:41:42	19.357	0.533	7.766	0.288
5/11/2021	10:42:40	19.362	0.541	7.768	0.292
5/11/2021	10:43:40	19.366	0.517	7.769	0.279
5/11/2021	10:44:42	19.353	0.533	7.764	0.287
5/11/2021	10:45:42	19.364	0.535	7.769	0.289
5/11/2021	10:46:42	19.373	0.53	7.772	0.286
5/11/2021	10:47:42	19.38	0.526	7.775	0.284
5/11/2021	10:48:42	19.385	0.513	7.777	0.278
5/11/2021	10:49:41	19.394	0.52	7.781	0.281
5/11/2021	10:50:40	19.403	0.514	7.784	0.278
5/11/2021	10:51:41	19.404	0.5	7.785	0.271
5/11/2021	10:52:41	19.406	0.501	7.785	0.271
5/11/2021	10:53:41	19.406	0.504	7.785	0.273
5/11/2021	10:54:41	19.411	0.512	7.787	0.277
5/11/2021	10:55:42	19.413	0.502	7.788	0.272
5/11/2021	10:56:42	19.419	0.501	7.79	0.271
5/11/2021	10:57:42	19.429	0.517	7.795	0.28
5/11/2021	10:58:42	19.439	0.501	7.799	0.271
5/11/2021	10:59:42	19.447	0.487	7.802	0.265
5/11/2021	11:00:42	19.45	0.472	7.803	0.257
5/11/2021	11:01:41	19.448	0.484	7.802	0.263
5/11/2021	11:02:41	19.448	0.486	7.802	0.264
5/11/2021	11:03:41	19.454	0.479	7.805	0.261
5/11/2021	11:04:42	19.458	0.472	7.806	0.257
5/11/2021	11:05:42	19.462	0.47	7.808	0.256
5/11/2021	11:06:42	19.461	0.47	7.807	0.256

Average of Test Run	O2	CO2	O2	CO2	
	%	%	%	%	
5/11/2021	11:06:54	19.396	0.513	7.781	0.278

Test Run 1 End

Advanced Industrial Resources, Inc.

Cyclonic Flow Absence Verification Field Data

EPA Method 1

Client: Magnitude 7 Metals

Location: Marston, Missouri

Source: Carbon Bake 2 - 5

Test Team: GE, LS, KF

Probe ID: P3-02

C_p: 0.84

t_m (°F): 60

Console ID: C-13

Y_m: 0.901

ΔH_@: 1.737

Assumed B_{ws}: 3%

P_{bar} (in. Hg): 30.00

Date: May 11, 2021

D_s (in.): 11.75

A_s (ft²): 0.753

D_n (in.): 0.210

A_n (ft²): 0.000241

Point	Δp (in. H ₂ O)	α (degrees)
1	0.0	0.0
2	0.0	5.0
3	0.0	5.0
4	0.0	0.0
Change Ports		
1	0.0	0.0
2	0.0	0.0
3	0.0	5.0
4	0.0	0.0

Advanced Industrial Resources, Inc.

Source Description Sheets

Client: Magnitude 7 Metals
Location: Marston, Missouri

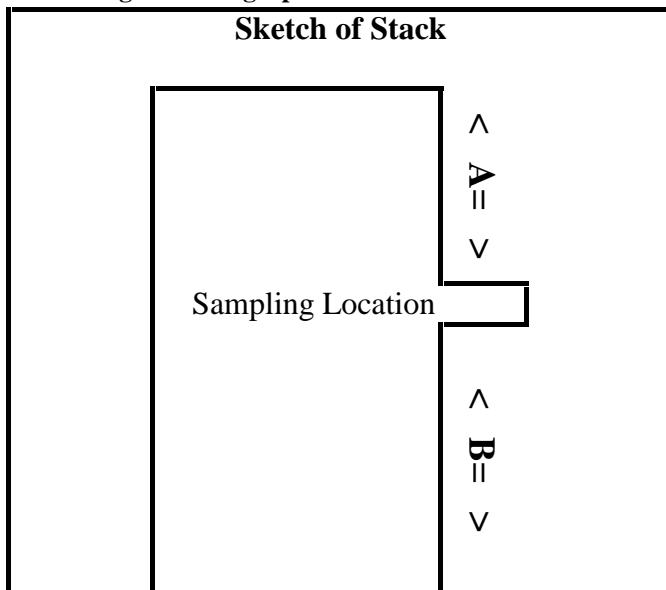
Source: Carbon Bake 2 - 5

D_n (in.): 0.210
A_n (ft²): 0.000241
D_s (in.): 11.75
A_s (ft²): 0.753
Length A: 24
Length B: 97
t_{amb} (°F): 60
Assumed B_{ws}: 3%
P_{bar} (in. Hg): 30.00
P_g (in. H₂O): -0.80
% O₂: 19.0%
% CO₂: 1.00%
Console ID: C-13
Y: 0.901
ΔH_@: 1.737
C_p: 0.84
K-Factor: 1.6

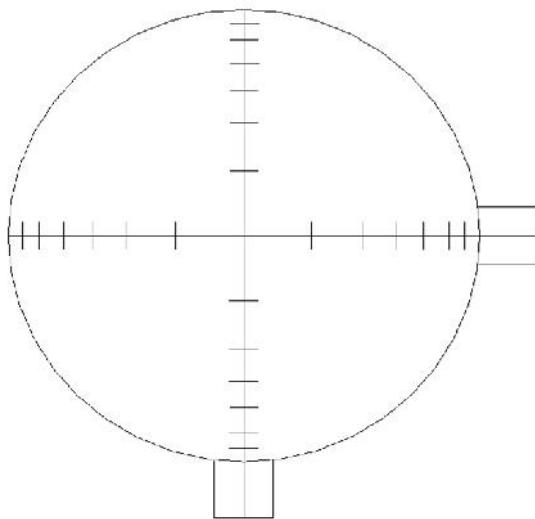
Date: May 11, 2021
Test Team: GE, LS, KF

Point	Δp (in. H ₂ O)	t _s (°F)
1	1.20	204
2	1.30	211
3	1.30	210
4	1.10	207
Change Ports		
1	1.30	208
2	1.40	212
3	1.10	213
4	1.00	210

Digital Photograph of Source Not Available



Traverse Point Locations for Magnitude 7 Metals Carbon Bake 2-5



11.75 Inch Diameter Stack
Two Ports at 90°

Sampling Point	Distance from Stack Wall (inches)
1	0.8
2	2.9
3	8.8
4	11.0

Advanced Industrial Resources, Inc.

Field Data Sheet

Client: Mag 7 Metals
 Location: Marston, MO
 Source: CB2-5
 Test Team: GE, LS, KF
 EPA Methods: 1-4, 29
 D_s (in.): 11.75
 % O₂: 19.4
 % CO₂: 0.51
 Start Run: 0715
 End Run: 1018
 Run Number: ① comp

Test Date: 5/11/21
 Console ID: C-13
 Y_m / ΔH_g: 0.901 / 1.737
 Sampling Box ID: B-13
 Probe Assembly ID: P3-02
 D_a (in.): 0.210
 Assumed B_{ws}: 3%
 P_{bar} (in. Hg): 30.00
 p_g (in. H₂O): -0.80
 Minutes/Point: 22.5
 K-Factor: 1.6

Point	Meter (def)	Inches H ₂ O		t _s	Probe	Filter Box	Last Impinger	Temperature Readings (°F)		Filter Exit (MS CPM)	Vacuum (in. Hg)
		Δp	ΔH LS					Inlet	Outlet LS		
1	517.919	1.2	+81.9	211	258	247	61	7160	7160	240	3
2	536.72	1.2	+81.9	208	246	256	57	61	61	247	3
3	555.31	1.3	2.1	210	248	260	60	67	67	249	3
4	575.94	1.1	1.8	210	244	258	62	70	70	251	3
5											
6											
7											
8											
9											
10											
11											
12											
Change Ports											
1	596.51	1.2	1.9	207	239	249	60	71	71	243	3
2	617.35	1.3	2.1	212	247	256	63	69	69	248	3
3	638.04	1.4	2.2	214	255	250	65	72	72	244	4
4	660.26	1.1	1.8	210	250	254	60	72	72	247	3
5											
6											
7											
8											
9											
10											
11											
12											
End 677.660											

Moisture Collected (g)		
Body:	Initial	Final
Silica Gel:	400.0	425.0
Gel Number:	200.0	10.0
	Total:	35.0

Pre-Run Leak Checks (defm @ "Hg)
 Sampling Line: 0.002 @ 15"
 Pitot A: ✓
 Pitot B: ✓

Post-Run Leak Checks (defm @ "Hg)
 Sampling Line: 0.002 @ 15"
 Pitot A: ✓
 Pitot B: ✓

Silica Gel Desc. (initial): Blue
 Silica Gel Desc. (final): Pink

Test Team Leader Review: _____
 Data Entry Review: _____

Reagent 1: HNO₃, Lot No: 18397463
 Reagent 2: H₂SO₄, Lot No: 19160074

H₂O₂ - C687108
 H₂O - Z036003
 HCl - C584901

REV021717

Advanced Industrial Resources, Inc.
Cyclonic Flow Absence Verification Field Data
EPA Method 1

Client: May 7 Metals
 Location: Marston, Mo
 Source: CB2-5
 Test Team: GE, LS, ICF
 Probe ID: P3-02
 C_p : 0.84

t_m ($^{\circ}$ F): 60
 Console ID: C-13
 Y_m : 0.901
 ΔH_{∞} : 1.737
 Assumed B_{ws} : 3%
 P_{bar} (in. Hg): 30.00

Date: 5/11/21
 D_s (in.): 6.75
 A_s (ft^2): 0.753
 D_n (in.): 0.210
 A_n (ft^2): 0.000241

Point	Δp (in. H_2O)	α (degrees)
1	0.0	0
2	0.0	5
3	0.0	5
4	0.0	0
5	0.0	
6	0.0	
7	0.0	
8	0.0	
9	0.0	
10	0.0	
11	0.0	
12	0.0	
Change Ports		
1	0.0	0
2	0.0	0
3	0.0	5
4	0.0	0
5	0.0	
6	0.0	
7	0.0	
8	-0.0	
9	0.0	
10	0.0	
11	0.0	
12	0.0	

Test Team Leader Review: _____
 Data Entry Review: _____

REV021717

Advanced Industrial Resources, Inc.

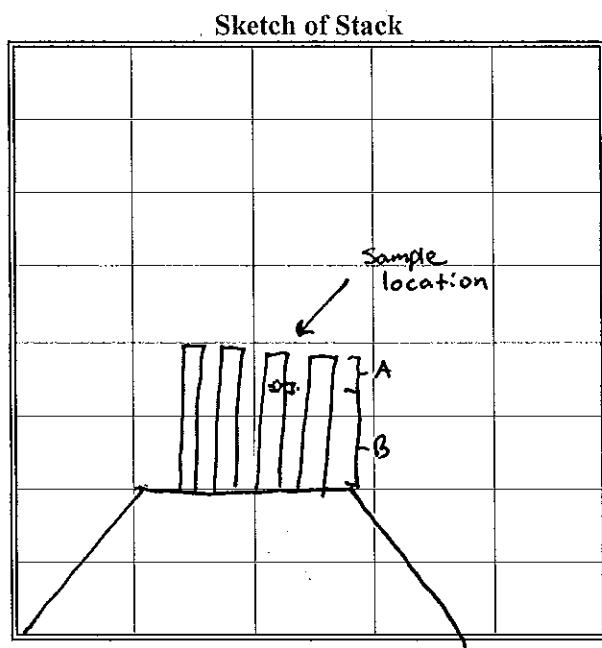
Source Description Sheets

Client: Mag 7 Metals
 Location: Marston, MO
 Source: CB2-S

Date: 5/11/21
 Test Team: GE, LS, KCF

D_n (in.): 0.210
 A_n (ft^2): 0.000241
 D_s (in.): 11.75
 A_s (ft^2): 0.753
 Length A (in.): 24
 Length B (in.): 97

t_{amb} ($^{\circ}\text{F}$): 60
 Assumed B_{ws} : 3\%
 P_{bar} (in. Hg): 30.00
 P_g (in. H_2O): ~0.80
 % O_2 : 19%
 % CO_2 : 1%
 Console ID: C-13
 Y: 0.901
 $\Delta H_{@}$: 1.737
 C_p : 0.84
 K-Factor: 1.6



Point	Δp (in. H_2O)	t_s ($^{\circ}\text{F}$)
1	1.2	204
2	1.3	211
3	1.3	210
4	1.1	207
5		
6		
7		
8		
9		
10		
11		
12		

Change Ports		
1	1.3	208
2	1.4	212
3	1.1	213
4	1.0	210
5		
6		
7		
8		
9		
10		
11		
12		

Test Team Leader Review: _____
 Data Entry Review: _____

CARBON BAKE 2 - 6



SOURCE NAME Magnitude 7 Metals		OBSERVATION DATE 5-11-21					START TIME 12:55		STOP TIME 1:10		
ADDRESS 391 St. Jude Industrial Park		SEC MIN	0	15	30	45	SEC MIN	0	15	30	45
P.O. Box 395		1	0	0	0	0	31				
CITY Marston STATE MO ZIP 63866		2	0	0	0	0	32				
PHONE 573-643-0023 SOURCE ID NUMBER Ep99		3	0	0	0	0	33				
PROCESS EQUIPMENT Carbon Bake #6		4	0	0	0	0	34				
CONTROL EQUIPMENT Scrubber & Baghouse		5	0	0	0	0	35				
DESCRIBE EMISSION POINT Multiple Stacks		6	0	0	0	0	36				
START HEIGHT ABOVE GROUND LEVEL 50		7	0	0	0	0	37				
STOP		8	0	0	0	0	38				
DISTANCE FROM OBSERVER START 600 STOP		9	0	0	0	0	39				
DESCRIBE EMISSIONS START STOP		10	0	0	0	0	40				
EMISSION COLOR START STOP		11	0	0	0	0	41				
WATER DROPLETS PRESENT: NO <input type="checkbox"/> YES <input checked="" type="checkbox"/>		12	0	0	0	0	42				
IF WATER DROPLET PLUME: ATTACHED <input type="checkbox"/> DETACHED <input type="checkbox"/>		13	0	0	0	0	43				
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED START STOP		14	0	0	0	0	44				
DESCRIBE BACKGROUND START Clouds STOP		15	0	0	0	0	45				
BACKGROUND COLOR START white/blue STOP		16					46				
SKY CONDITIONS START cloudy STOP		17					47				
WIND SPEED START 10 mph STOP		18					48				
WIND DIRECTION START NE STOP		19					49				
AMBIENT TEMP START 57°F STOP		20					50				
WET BULB TEMP RH.percent		21					51				
		22					52				
		23					53				
		24					54				
		25					55				
		26					56				
		27					57				
		28					58				
		29					59				
		30					60				
Source Layout Sketch		Draw North Arrow					AVERAGE OPACITY FOR HIGHEST PERIOD		NUMBER OF READINGS ABOVE % WERE		
							0 MINIMUM		20 0		
							0 MAXIMUM				
Key							OBSERVER'S NAME (PRINT) Alicia Powell				
Sun		< Plume → Wind									
COMMENTS Mercury PFC "Air" Testing NH							OBSERVER'S SIGNATURE Alicia Powell		DATE 5-11-21		
I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS SIGNATURE							ORGANIZATION Magnitude 7 Metals		DATE		
TITLE		DATE					VERIFIED BY:		DATE		

Advanced Industrial Resources, Inc.

Field Data Sheet

Client:	Magnitude 7 Metals	Test Date:	May 11, 2021
Location:	Marston, Missouri	Console ID:	C-13
Source:	Carbon Bake 2 - 6	Y_m / ΔH_@:	0.901 1.737
Test Team:	GE, LS, KF	Sampling Box ID:	B-13
EPA Methods:	1, 2, 3A, 4, 29	Probe Assembly ID:	P3-02
D _s (in.):	11.75	D _n (in.):	0.210
% O ₂	19.5	Assumed B _{ws} :	3.0
% CO ₂	0.4	P _{bar} (in. Hg):	30.00
Start Run:	12:15 PM	p _g (in. H ₂ O):	-0.38
End Run:	3:33 PM	Minutes/Point:	22.5
Run Number:	1	K-Factor:	1.6

Point	Meter (dcf)	Inches H ₂ O		(Δp) ^{1/2}	Temperature Readings (°F)						Vacuum (in. Hg)
		Δp	ΔH		t _s	Probe	Filter	Last Impinger	t _m Average		
1	677.757	1.20	1.9	1.095	209	249	254	66	72		3
2	697.11	1.30	2.1	1.140	211	249	256	63	73		3
3	717.43	1.20	1.9	1.095	214	243	248	62	75		3
4	737.33	0.98	1.6	0.990	210	252	252	63	78		3
5	755.03	1.30	2.1	1.140	211	249	259	62	77		3
6	776.07	1.20	1.9	1.095	212	251	251	65	81		3
7	795.92	1.20	1.9	1.095	208	244	246	66	82		3
8	816.39	1.10	1.8	1.049	206	255	251	67	84		3
End	835.584										

Total Moisture Collected (mL): 29.0
 Theoretical maximum moisture collection at saturation (ml): 2828.2
 Pre System Leak Check (cfm): 0.005
 Post System Leak Check (cfm): 0.005

Test Run 1 Begin. STRATA Version 3.2.112

Operator: Greg Essig

Plant Name: Magnitude 7 Metals

Location: Marston, MO. CB2-6

O2	CO2	O2	CO2
%	%	Volts	Volts

Begin calculating run averages

5/11/2021	16:13:47	19.496	0.405	7.821	0.223
5/11/2021	16:14:47	19.503	0.41	7.824	0.226
5/11/2021	16:15:46	19.492	0.383	7.82	0.213
5/11/2021	16:16:46	19.491	0.395	7.819	0.218
5/11/2021	16:17:45	19.488	0.404	7.818	0.223
5/11/2021	16:18:46	19.495	0.391	7.821	0.216
5/11/2021	16:19:46	19.508	0.398	7.826	0.22
5/11/2021	16:20:45	19.515	0.384	7.829	0.213
5/11/2021	16:21:47	19.536	0.383	7.837	0.213
5/11/2021	16:22:47	19.516	0.358	7.829	0.2
5/11/2021	16:23:46	19.517	0.361	7.83	0.201
5/11/2021	16:24:46	19.516	0.371	7.83	0.206
5/11/2021	16:25:45	19.52	0.375	7.831	0.209
5/11/2021	16:26:45	19.523	0.376	7.832	0.209
5/11/2021	16:27:45	19.527	0.359	7.834	0.201
5/11/2021	16:28:45	19.532	0.362	7.836	0.202
5/11/2021	16:29:45	19.535	0.362	7.837	0.202
5/11/2021	16:30:45	19.539	0.351	7.838	0.197
5/11/2021	16:31:47	19.539	0.355	7.839	0.199
5/11/2021	16:32:45	19.543	0.345	7.84	0.194
5/11/2021	16:33:45	19.546	0.336	7.841	0.189
5/11/2021	16:34:45	19.551	0.341	7.844	0.192
5/11/2021	16:35:45	19.554	0.341	7.845	0.191
5/11/2021	16:36:45	19.557	0.328	7.846	0.185
5/11/2021	16:37:45	19.557	0.332	7.846	0.187
5/11/2021	16:38:45	19.557	0.329	7.846	0.186
5/11/2021	16:39:45	19.561	0.318	7.847	0.18
5/11/2021	16:40:46	19.563	0.313	7.848	0.177
5/11/2021	16:41:46	19.566	0.316	7.85	0.179
5/11/2021	16:42:46	19.57	0.31	7.851	0.176
5/11/2021	16:43:46	19.573	0.311	7.852	0.176
5/11/2021	16:44:46	19.576	0.299	7.853	0.171
5/11/2021	16:45:46	19.579	0.307	7.855	0.175
5/11/2021	16:46:46	19.581	0.291	7.856	0.166

Average of Test Run	O2	CO2	O2	CO2	
	%	%	%	%	
5/11/2021	16:47:15	19.537	0.352	7.838	0.197

Test Run 1 End

Advanced Industrial Resources, Inc.

Cyclonic Flow Absence Verification Field Data

EPA Method 1

Client: Magnitude 7 Metals

Location: Marston, Missouri

Source: Carbon Bake 2 - 6

Test Team: GE, LS, KF

Probe ID: P3-02

C_p: 0.84

t_m (°F): 71

Console ID: C-13

Y_m: 0.901

ΔH_@: 1.737

Assumed B_{ws}: 3%

P_{bar} (in. Hg): 30.00

Date: May 11, 2021

D_s (in.): 11.75

A_s (ft²): 0.753

D_n (in.): 0.210

A_n (ft²): 0.000241

Point	Δp (in. H ₂ O)	α (degrees)
1	0.0	0.0
2	0.0	0.0
3	0.0	5.0
4	0.0	0.0
Change Ports		
1	0.0	0.0
2	0.0	5.0
3	0.0	5.0
4	0.0	0.0

Advanced Industrial Resources, Inc.

Source Description Sheets

Client: Magnitude 7 Metals
Location: Marston, Missouri

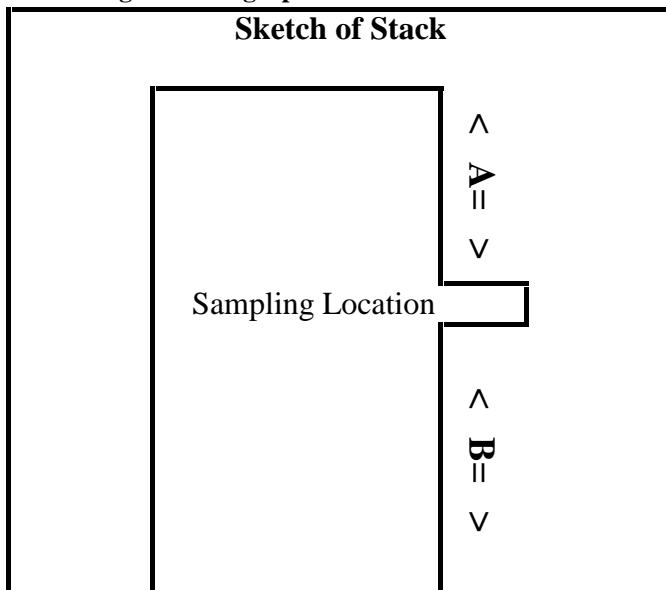
Source: Carbon Bake 2 - 6

D_n (in.): 0.210
A_n (ft²): 0.000241
D_s (in.): 11.75
A_s (ft²): 0.753
Length A: 24
Length B: 97
t_{amb} (°F): 95
Assumed B_{ws}: 3%
P_{bar} (in. Hg): 30
P_g (in. H₂O): -0.38
% O₂: 19.5%
% CO₂: 1.0%
Console ID: C-13
Y: 0.901
ΔH_@: 1.737
C_p: 0.84
K-Factor: 1.6

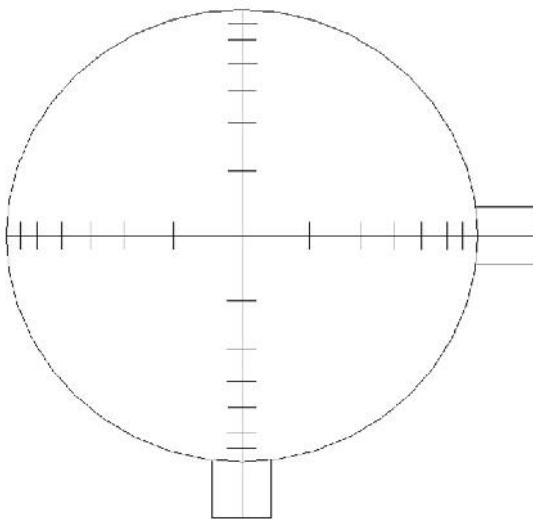
Date: May 11, 2021
Test Team: GE, LS, KF

Point	Δp (in. H ₂ O)	t _s (°F)
1	1.20	190
2	1.30	198
3	1.20	208
4	0.94	211
Change Ports		
1	1.30	209
2	1.30	210
3	1.20	211
4	1.10	210

Digital Photograph of Source Not Available



Traverse Point Locations for Magnitude 7 Metals Carbon Bake 2-6



11.75 Inch Diameter Stack
Two Ports at 90°

Sampling Point	Distance from Stack Wall (inches)
1	0.8
2	2.9
3	8.8
4	11.0

Advanced Industrial Resources, Inc.

Field Data Sheet

Client: Mag 7 Metals
 Location: Marston, MO
 Source: CBZ-6
 Test Team: GE, LS, KF
 EPA Methods: 1-4, 29
 D_s (in.): 11.75
 % O₂: 19.54
 % CO₂: 0.35
 Start Run: 12:15
 End Run: 15:33
 Run Number: 2 comp
 LS 1

Test Date: 5/11/21
 Console ID: C-13
 Y_m / ΔH_@: 0.901 / 1.737
 Sampling Box ID: B-13
 Probe Assembly ID: P3-02
 D_n (in.): 0.210
 Assumed B_{ws}: 3%
 P_{bar} (in. Hg): 30.00
 p_g (in. H₂O): -0.38
 Minutes/Point: 22.5
 K-Factor: 1.6

Point	Meter (def)	Inches H ₂ O		t _s	Probe	Filter Box	Last Impinger	Temperature Readings (°F)		Filter Exit (MS CPM)	Vacuum (in. Hg)
		Δp	ΔH					Inlet	t _m		
1	677.757	1.2	1.9	209	249	254	66	72	72	244	3
2	697.11	1.3	2.1	211	249	256	63	73	73	248	3
3	717.43	1.2	1.9	214	243	248	62	75	75	242	3
4	737.33	0.98	1.6	210	252	252	63	78	78	246	3
5											
6											
7											
8											
9											
10											
11											
12											
Change Ports											
1	755.03	1.3	2.1	211	249	259	62	77	77	251	3
2	776.07	1.2	1.9	212	251	251	65	81	81	245	3
3	795.92	1.2	1.9	208	244	246	66	82	82	241	3
4	816.39	1.1	1.8	204	255	251	67	84	84	243	3
5											
6											
7											
8											
9											
10											
11											
12											
End	835.584										

	Moisture Collected (g)		
	Initial	Final	Net
Body:	400.0	422.0	22.0
Silica Gel:	200.0	207.0	7.0
Gel Number:		Total:	29.0

Silica Gel Desc. (initial): Blue
 Silica Gel Desc. (final): Pink

Test Team Leader Review: _____
 Data Entry Review: _____

Pre-Run Leak Checks (defm @ "Hg)
 Sampling Line: 0.005 @ 15'
 Pitot A: ✓
 Pitot B: ✓

Post-Run Leak Checks (defm @ "Hg)
 Sampling Line: 0.005 @ 15'
 Pitot A: ✓
 Pitot B: ✓

Reagent 1: HNO₃, Lot No: 18397463
 Reagent 2: H₂SO₄, Lot No: 19160074

H₂O₂ - C687W8
 H₂O - 2036003
 HCl - C584906

REV021717

Pause
 12:20
 Resume
 12:35

Advanced Industrial Resources, Inc.
Cyclonic Flow Absence Verification Field Data
EPA Method 1

Client: Mag 7 Metals
 Location: Marston, MO
 Source: CB2-G
 Test Team: GE, LS, KP
 Probe ID: P3-02
 C_p: 0.84

t_m (°F): 71
 Console ID: C-13
 Y_m: 0.901
 ΔH_@: 1.737
 Assumed B_{ws}: 3%
 P_{bar} (in. Hg): 30.00

Date: 5/11/21
 D_s (in.): 11.75
 A_s (ft²): 0.753
 D_n (in.): 0.210
 A_n (ft²): 0.000241

Point	Δp (in. H ₂ O)	α (degrees)
1	0.0	0
2	0.0	0
3	0.0	5
4	0.0	0
5	0.0	
6	0.0	
7	0.0	
8	0.0	
9	0.0	
10	0.0	
11	0.0	
12	0.0	

Change Ports		
1	0.0	0
2	0.0	5
3	0.0	5
4	0.0	0
5	0.0	
6	0.0	
7	0.0	
8	0.0	
9	0.0	
10	0.0	
11	0.0	
12	0.0	

Test Team Leader Review: _____
 Data Entry Review: _____

Advanced Industrial Resources, Inc.

Source Description Sheets

Client: Mug 7 Metals
 Location: Marston, MO
 Source: CB2-6

Date: 5/11/21
 Test Team: GE, LS, ICF

D_n (in.): 0.210
 A_n (ft²): 0.000241
 D_s (in.): 11.75
 A_s (ft²): 0.753
 Length A (in.): 24
 Length B (in.): 97

t_{amb} (°F): 68
 Assumed B_{ws}: 3%
 P_{bar} (in. Hg): 30.00
 P_g (in. H₂O): -0.38
 % O₂: 19
 % CO₂: 3
 Console ID: C-13
 Y: 0.901
 ΔH_@: 1.737
 C_p: 0.84
 K-Factor: 1.6

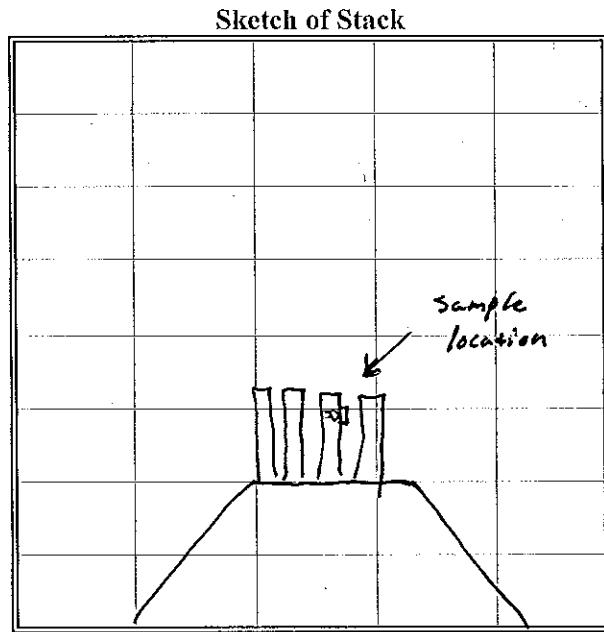
Point	Δp (in. H ₂ O)	t _s (°F)
1	1.2	190
2	1.3	184
3	1.2	208
4	0.94	211
5		
6		
7		
8		
9		
10		
11		
12		

198 LS

Change Ports

1	1.3	209
2	1.3	210
3	1.2	211
4	1.1	210
5		
6		
7		
8		
9		
10		
11		
12		

160 ft³



Test Team Leader Review: _____

Data Entry Review: _____

CARBON BAKE 2 - 7



Visible Emissions Observation Form

SOURCE NAME Magnitude 7 Metals		OBSERVATION DATE 5/13/21				START TIME 1025		STOP TIME 1040			
ADDRESS 391 St. Jude Industrial Park		SEC MIN	0	15	30	45	SEC MIN	0	15	30	45
P.O. Box 395		1	0	0	0	0	31				
		2	0	0	0	0	32				
CITY Marston STATE MO ZIP 63866		3	0	0	0	0	33				
PHONE 573-643-0023		4	0	0	0	0	34				
PROCESS EQUIPMENT CB Scrubber 7		5	0	0	0	0	35				
CONTROL EQUIPMENT Scrubbers a Baghouse		6	0	0	0	0	36				
DESCRIBE EMISSION POINT		7	0	0	0	0	37				
START		8	0	0	0	0	38				
HEIGHT ABOVE GROUND LEVEL 50'		9	0	0	0	0	39				
HEIGHT RELATIVE TO OBSERVER START 40' STOP 30'		10	0	0	0	0	40				
DISTANCE FROM OBSERVER START 700' STOP		11	0	0	0	0	41				
DIRECTION FROM OBSERVER START NW STOP		12	0	0	0	0	42				
DESCRIBE EMISSIONS		13	0	0	0	0	43				
START STOP		14	0	0	0	0	44				
EMISSION COLOR START STOP		15	0	0	0	0	45				
WATER DROPLETS PRESENT: NO <input type="checkbox"/> YES <input checked="" type="checkbox"/>		16					46				
IF WATER DROPLET PLUME: ATTACHED <input type="checkbox"/> DETACHED <input type="checkbox"/>		17					47				
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED		18					48				
START STOP		19					49				
DESCRIBE BACKGROUND		20					50				
START Steel building STOP		21					51				
BACKGROUND COLOR START Gray STOP SKY CONDITIONS START Clear STOP		22					52				
WIND SPEED START 2-5 mph STOP WIND DIRECTION START NE STOP		23					53				
AMBIENT TEMP START 63°F STOP WET BULB TEMP RH.percent		24					54				
Source Layout Sketch		25					55				
		26					56				
		27					57				
		28					58				
		29					59				
		30					60				
AVERAGE OPACITY FOR HIGHEST PERIOD		NUMBER OF READINGS ABOVE 20 % WERE 0									
RANGE OF OPACITY READINGS		MINIMUM MAXIMUM									
OBSERVER'S NAME (PRINT)		Nancy Halford									
COMMENTS		OBSERVER'S SIGNATURE Nancy Halford				DATE 5/13/21					
I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS SIGNATURE		CERTIFIED BY:				DATE					
TITLE		DATE		VERIFIED BY:		DATE					

Advanced Industrial Resources, Inc.

Field Data Sheet

Client: Magnitude 7 Metals
Location: Marston, Missouri
Source: Carbon Bake 2 - 7
Test Team: GE, LS, KF
EPA Methods: 1, 2, 3A, 4, 29
D_s (in.): 11.75
% O₂ 19.47
% CO₂ 0.31
Start Run: 7:30 AM
End Run: 10:35 AM
Run Number: 1

Test Date: May 13, 2021
Console ID: C-013
Y_m / ΔH_@: 0.901 1.737
Sampling Box ID: B-5
Probe Assembly ID: P3-02
D_n (in.): 0.200
Assumed B_{ws}: 2.0
P_{bar} (in. Hg): 30.17
p_g (in. H₂O): -0.24
Minutes/Point: 22.5
K-Factor: 1.4

		Inches H ₂ O		Temperature Readings (°F)						
Point	Meter (dcf)	Δp	(Δp) ^{1/2}	t _s	Probe	Filter	Last Impinger	t _m Average	Filter Exit	Vacuum (in. Hg)
1	835.690	1.30	1.140	171	249	253	66	68	250	3
2	854.75	1.70	1.304	176	252	254	66	75	253	4
3	875.68	1.70	1.304	160	253	257	64	78	253	4
4	897.25	1.00	1.000	158	249	251	59	81	254	3
5	915.54	1.10	1.049	159	247	245	62	84	251	3
6	932.05	1.20	1.095	160	250	251	63	87	248	3
7	950.48	1.00	1.000	161	252	253	62	89	250	3
8	967.92	1.00	1.000	158	247	248	62	91	252	3
End	985.435									

Total Moisture Collected (mL): 32.0
Theoretical maximum moisture collection at saturation (ml): 1466.6
Pre System Leak Check (cfm): 0.000
Post System Leak Check (cfm): 0.000

Test Run 1 Begin. STRATA Version 3.2.112

Operator: Greg Essig

Plant Name: Magnitude 7 Metals

Location: Marston, MO. CB2-7

	O2 %	CO2 %	O2 Volts	CO2 Volts	
5/13/2021	10:49:37	19.352	0.268	7.751	0.165
5/13/2021	10:50:37	19.367	0.393	7.757	0.227
5/13/2021	10:51:35	19.379	0.383	7.762	0.222
5/13/2021	10:52:35	19.39	0.37	7.766	0.216
5/13/2021	10:53:37	19.399	0.351	7.77	0.206
5/13/2021	10:54:37	19.405	0.349	7.772	0.205
5/13/2021	10:55:37	19.417	0.35	7.777	0.206
5/13/2021	10:56:37	19.425	0.36	7.78	0.211
5/13/2021	10:57:37	19.431	0.354	7.782	0.208
5/13/2021	10:58:37	19.439	0.322	7.786	0.192
5/13/2021	10:59:37	19.443	0.326	7.787	0.194
5/13/2021	11:00:37	19.445	0.338	7.788	0.2
5/13/2021	11:01:37	19.45	0.331	7.79	0.197
5/13/2021	11:02:37	19.453	0.325	7.791	0.193
5/13/2021	11:03:37	19.453	0.326	7.791	0.194
5/13/2021	11:04:37	19.455	0.331	7.792	0.197
5/13/2021	11:05:37	19.456	0.305	7.792	0.183
5/13/2021	11:06:37	19.461	0.314	7.794	0.188
5/13/2021	11:07:37	19.461	0.321	7.794	0.192
5/13/2021	11:08:37	19.465	0.321	7.796	0.191
5/13/2021	11:09:37	19.467	0.322	7.797	0.192
5/13/2021	11:10:37	19.469	0.3	7.798	0.181
5/13/2021	11:11:37	19.423	0.31	7.779	0.186
5/13/2021	11:12:35	19.435	0.345	7.784	0.204
5/13/2021	11:13:35	19.443	0.333	7.787	0.197
5/13/2021	11:14:35	19.448	0.341	7.789	0.202
5/13/2021	11:15:37	19.454	0.312	7.792	0.187
5/13/2021	11:16:35	19.459	0.296	7.794	0.179
5/13/2021	11:17:36	19.463	0.323	7.795	0.192
5/13/2021	11:18:36	19.463	0.316	7.795	0.189
5/13/2021	11:19:36	19.467	0.306	7.797	0.184
5/13/2021	11:20:36	19.472	0.314	7.799	0.188
5/13/2021	11:21:37	19.476	0.313	7.8	0.188
5/13/2021	11:22:37	19.476	0.315	7.801	0.188
5/13/2021	11:23:37	19.48	0.307	7.802	0.184
5/13/2021	11:24:36	19.483	0.31	7.803	0.186
5/13/2021	11:25:35	19.487	0.296	7.805	0.179
5/13/2021	11:26:37	19.489	0.311	7.805	0.186
5/13/2021	11:27:37	19.491	0.299	7.807	0.18
5/13/2021	11:28:36	19.494	0.291	7.808	0.177
5/13/2021	11:29:36	19.497	0.299	7.809	0.181
5/13/2021	11:30:36	19.497	0.298	7.809	0.18
5/13/2021	11:31:35	19.497	0.307	7.809	0.184
5/13/2021	11:32:37	19.503	0.29	7.811	0.176

Test Run 1 Begin. STRATA Version 3.2.112

Operator: Greg Essig

Plant Name: Magnitude 7 Metals

Location: Marston, MO. CB2-7

		O2 %	CO2 %	O2 Volts	CO2 Volts	
5/13/2021	11:33:37	19.507	0.286	7.813	0.174	
5/13/2021	11:34:37	19.507	0.284	7.813	0.173	
5/13/2021	11:35:36	19.509	0.29	7.813	0.176	
5/13/2021	11:36:36	19.514	0.289	7.815	0.175	
5/13/2021	11:37:36	19.518	0.274	7.817	0.168	
5/13/2021	11:38:37	19.516	0.284	7.816	0.173	
5/13/2021	11:39:37	19.52	0.272	7.818	0.167	
5/13/2021	11:40:37	19.523	0.281	7.819	0.171	
5/13/2021	11:41:37	19.522	0.268	7.819	0.165	
5/13/2021	11:42:36	19.525	0.273	7.82	0.168	
5/13/2021	11:43:36	19.525	0.278	7.82	0.17	
5/13/2021	11:44:35	19.528	0.284	7.821	0.173	
5/13/2021	11:45:37	19.53	0.274	7.822	0.168	
5/13/2021	11:46:37	19.529	0.262	7.822	0.162	
Average of Test Run		O2 %	CO2 %	O2 %	CO2 %	
	5/13/2021	11:47:30	19.468	0.311	7.797	0.187

Test Run 1 End

Advanced Industrial Resources, Inc.

Cyclonic Flow Absence Verification Field Data

EPA Method 1

Client: Magnitude 7 Metals

Location: Marston, Missouri

Source: Carbon Bake 2 - 7

Test Team: GE, LS, KF

Probe ID: P3-02

C_p: 0.84

t_m (°F): 70

Console ID: C-013

Y_m: 0.901

ΔH_@: 1.737

Assumed B_{ws}: 2%

P_{bar} (in. Hg): 30.17

Date: May 13, 2021

D_s (in.): 11.75

A_s (ft²): 0.753

D_n (in.): 0.200

A_n (ft²): 0.007853

Point	Δp (in. H ₂ O)	α (degrees)
1	0.0	0.0
2	0.0	5.0
3	0.0	0.0
4	0.0	0.0
Change Ports		
1	0.0	0.0
2	0.0	0.0
3	0.0	5.0
4	0.0	0.0

Advanced Industrial Resources, Inc.

Source Description Sheets

Client: Magnitude 7 Metals
Location: Marston, Missouri

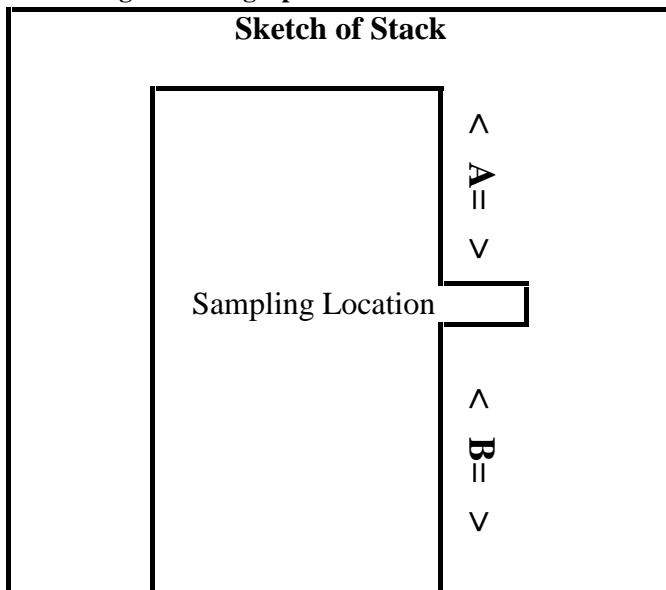
Source: Carbon Bake 2 - 7

D_n (in.): 0.200
A_n (ft²): 0.007853
D_s (in.): 11.75
A_s (ft²): 0.753
Length A: 24
Length B: 97
t_{amb} (°F): 70
Assumed B_{ws}: 2%
P_{bar} (in. Hg): 30.17
P_g (in. H₂O): -0.24
% O₂: 19.0%
% CO₂: 1.0%
Console ID: C-013
Y: 0.901
ΔH_@: 1.737
C_p: 0.84
K-Factor: 1.4

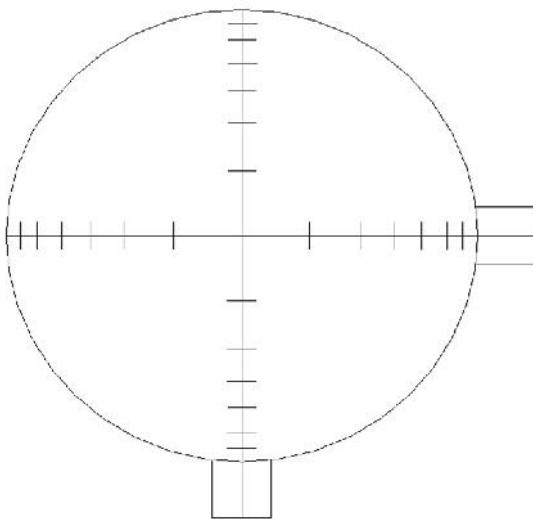
Date: May 13, 2021
Test Team: GE, LS, KF

Point	Δp (in. H ₂ O)	t _s (°F)
1	1.20	170
2	1.20	172
3	1.10	171
4	1.00	168
Change Ports		
1	1.30	171
2	1.60	171
3	1.20	170
4	1.00	167

Digital Photograph of Source Not Available



Traverse Point Locations for Magnitude 7 Metals Carbon Bake 2-7



11.75 Inch Diameter Stack
Two Ports at 90°

Sampling Point	Distance from Stack Wall (inches)
1	0.8
2	2.9
3	8.8
4	11.0

Advanced Industrial Resources, Inc.

Field Data Sheet

Client: MAG 7 METALS
 Location: MARSTON, MO
 Source: CB2-7
 Test Team: LE, LS, KF
 EPA Methods: 1-4, 29
 D_s (in.): 11.75
 % O₂: 19.47
 % CO₂: .31
 Start Run: 0730
 End Run: 1035
 Run Number: 251 KF

Test Date: 5-13-21
 Console ID: C-013
 Y_m / ΔH_@: .901, 1.737
 Sampling Box ID: B-5
 Probe Assembly ID: P3-02
 D_n (in.): .200
 Assumed B_{ws}: 2%
 P_{bar} (in. Hg): 30.17
 p_g (in. H₂O): - .24
 Minutes/Point: 22.5
 K-Factor: 1.4

Point	Meter (def)	Inches H ₂ O		Temperature Readings (°F)					Filter Exit (MS or CPM)	Vacuum (in. Hg)	
		Δp	ΔH	t _s	Probe	Filter Box	Last Impinger	t _m			
								Inlet	Outlet		
1	833.690	1.3	1.82	171	249	253	66	68	68	250	3
2	954.75	1.7	2.38	176	252	254	66	75	75	253	4
3	875.68	1.7	2.38	160	253	257	64	73	78	253	4
4	897.25	1.0	1.4	158	249	251	59	81	81	254	3
5	915.542	1.1	1.54	159	247	245	62	84	84	251	3
6	932.05	1.2	1.68	160	250	251	63	87	87	248	3
7	950.48	1.0	1.4	161	252	253	62	89	89	250	3
8	967.92	1.0	1.4	158	247	248	62	91	91	252	3
9											
10											
11											
12											
Change Ports											
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
End	985.435										

	Moisture Collected (g)		
	Initial	Final	Net
Body:	400.0	422.0	22.0
Silica Gel:	200.0	210.0	10.0
Gel Number:		Total:	32.0

Silica Gel Desc. (initial): BLUE
 Silica Gel Desc. (final): PINK

Test Team Leader Review: _____

Data Entry Review: _____

Pre-Run Leak Checks (defm @ "Hg)
 Sampling Line: 0.000 @ 8

Pitot A: ✓

Pitot B: ✓

Post-Run Leak Checks (defm @ "Hg)
 Sampling Line: 0.000 @ 5

Pitot A: ✓

Pitot B: ✓

Reagent 1: HNO₃ Lot No: 18397463
 Reagent 2: H₂SO₄ Lot No: 19160074

H₂O₂ - L687108

H₂O - 2036003

HCL - L584901

Advanced Industrial Resources, Inc.
Cyclonic Flow Absence Verification Field Data
EPA Method 1

Client: MAG 7 METALS
 Location: MARSTON, MO
 Source: LB2-7
 Test Team: GE, LS, KP
 Probe ID: P3-02
 C_p: 0.84

t_m (°F): 70
 Console ID: L-013
 Y_m: .901
 ΔH_@: 1.737
 Assumed B_{ws}: 2%
 P_{bar} (in. Hg): 30.17

Date: 5-13-21
 D_s (in.): 11.75
 A_s (ft²): 0.753
 D_n (in.): .200
 A_n (ft²): 0.007853

Point	Δp (in. H ₂ O)	α (degrees)
1	0.0	0
2	0.0	5
3	0.0	0
4	0.0	0
5	0.0	
6	0.0	
7	0.0	
8	0.0	
9	0.0	
10	0.0	
11	0.0	
12	0.0	

Change Ports		
1	0.0	0
2	0.0	0
3	0.0	5
4	0.0	0
5	0.0	
6	0.0	
7	0.0	
8	0.0	
9	0.0	
10	0.0	
11	0.0	
12	0.0	

Test Team Leader Review: _____
 Data Entry Review: _____

Advanced Industrial Resources, Inc.

Source Description Sheets

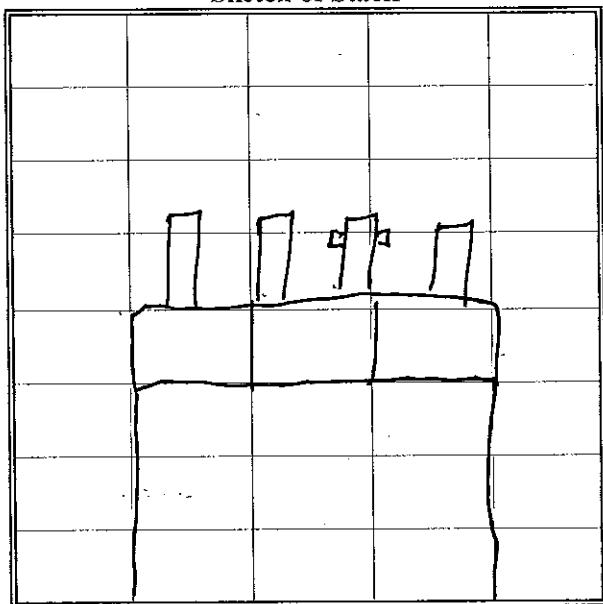
Client: MAG & METALS
 Location: MARSTON, MO
 Source: CB2-7

Date: 5-13-21
 Test Team: GE, LS, KF

D_n (in.): .200
 A_n (ft²): 0.007853
 D_s (in.): 11.75
 A_s (ft²): 0.753
 Length A (in.): 24
 Length B (in.): 97

 t_{amb} (°F): 70
 Assumed B_{ws}: 20%
 P_{bar} (in. Hg): 30.17
 P_g (in. H₂O): - .24
 % O₂: 19
 % CO₂: 1
 Console ID: C-013
 Y: .901
 ΔH_@: 1.737
 C_p: 0.84
 K-Factor: 1.4

Sketch of Stack



Point	Δp (in. H ₂ O)	t _s (°F)
1	1.2	170
2	1.2	172
3	1.1	171
4	1.0	168
5		
6		
7		
8		
9		
10		
11		
12		

Change Ports		
1	1.3	171
2	1.6	171
3	1.2	170
4	1.0	167
5		
6		
7		
8		
9		
10		
11		
12		

Test Team Leader Review: _____

Data Entry Review: _____

CARBON BAKE 2 - 8



SOURCE NAME Magnitude 7 Metals			OBSERVATION DATE 5/13/21					START TIME 1158		STOP TIME 1213		
ADDRESS 391 St. Jude Industrial Park			SEC MIN	0	15	30	45	SEC MIN	0	15	30	45
P.O. Box 395			1	0	0	0	0	31				
			2	0	0	0	0	32				
CITY Marston STATE MO ZIP 63866			3	0	0	0	0	33				
PHONE 573-643-0023 SOURCE ID NUMBER EP 99			4	0	0	0	0	34				
PROCESS EQUIPMENT CB Scrubber S			5	0	0	0	0	35				
CONTROL EQUIPMENT Scrubbers & Baghouse			6	0	0	0	0	36				
DESCRIBE EMISSION POINT Multiple Stacks			7	0	0	0	0	37				
START HEIGHT ABOVE GROUND LEVEL 50'			8	0	0	0	0	38				
HEIGHT RELATIVE TO OBSERVER START 50' STOP			9	0	0	0	0	39				
DISTANCE FROM OBSERVER START 500' STOP			10	0	0	0	0	40				
DIRECTION FROM OBSERVER START N STOP			11	0	0	0	0	41				
DESCRIBE EMISSIONS START STOP			12	0	0	0	0	42				
EMISSION COLOR START STOP			13	0	0	0	0	43				
PLUME TYPE: CONTINUOUS <input type="checkbox"/> FUGITIVE <input type="checkbox"/> INTERMITTENT <input type="checkbox"/>			14	0	0	0	0	44				
WATER DROPLETS PRESENT: NO <input type="checkbox"/> YES <input checked="" type="checkbox"/> IF WATER DROPLET PLUME: ATTACHED <input type="checkbox"/> DETACHED <input type="checkbox"/>			15	0	0	0	0	45				
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED START STOP			16					46				
DESCRIBE BACKGROUND START Sky w/Scattered Clouds STOP			17					47				
START STOP			18					48				
BACKGROUND COLOR START Blue STOP SKY CONDITIONS START Scattered Clouds STOP			19					49				
WIND SPEED START 2-5 mph STOP WIND DIRECTION START NE STOP			20					50				
AMBIENT TEMP START STOP WET BULB TEMP RH.percent			21					51				
Source Layout Sketch			22					52				
			23					53				
			24					54				
			25					55				
			26					56				
			27					57				
			28					58				
			29					59				
			30					60				
AVERAGE OPACITY FOR HIGHEST PERIOD								NUMBER OF READINGS ABOVE % WERE 0				
RANGE OF OPACITY READINGS								MINIMUM MAXIMUM				
OBSERVER'S NAME (PRINT) Nancy Halford												
COMMENTS								OBSERVER'S SIGNATURE Nancy Halford		DATE 5/13/21		
								ORGANIZATION Magnitude 7 Metals				
I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS SIGNATURE								CERTIFIED BY:		DATE		
TITLE			DATE		VERIFIED BY:		DATE					

Advanced Industrial Resources, Inc.

Field Data Sheet

Client: Magnitude 7 Metals
Location: Marston, Missouri
Source: Carbon Bake 2 - 8
Test Team: GE, LS, KF
EPA Methods: 1, 2, 3A, 4, 29
D_s (in.): 11.75
% O₂ 19.67
% CO₂ 0.20
Start Run: 11:20 AM
End Run: 2:24 PM
Run Number: 1

Test Date: May 13, 2021
Console ID: C-013
Y_m / ΔH_@: 0.901 1.737
Sampling Box ID: B-5
Probe Assembly ID: P3-2
D_n (in.): 0.210
Assumed B_{ws}: 2.0
P_{bar} (in. Hg): 30.17
p_g (in. H₂O): -0.36
Minutes/Point: 22.5
K-Factor: 1.6

Point	Meter (dcf)	Inches H ₂ O		t _s	Temperature Readings (°F)				
		Δp	(Δp) ^{1/2}		Probe	Filter	Last Impinger	t _m Average	Vacuum (in. Hg)
1	985.496	1.30	1.140	205	245	248	67	80	4
2	1005.45	1.20	1.095	204	249	254	65	82	3
3	1023.55	1.40	1.183	205	252	258	62	83	4
4	1044.15	1.30	1.140	205	255	258	60	83	4
5	1065.06	1.30	1.140	205	256	258	61	85	4
6	1085.25	1.30	1.140	204	255	253	62	86	4
7	1106.16	1.10	1.049	204	253	252	64	86	3
8	1124.95	1.20	1.095	205	254	254	64	88	3
End	1144.295								

Total Moisture Collected (mL): 32.0
Theoretical maximum moisture collection at saturation (ml): 16124.5
Pre System Leak Check (cfm): 0.000
Post System Leak Check (cfm): 0.001

Test Run 1 Begin. STRATA Version 3.2.112

Operator: Greg Essig

Plant Name: Magnitude 7 Metals

Location: Marston, MO. CB2-8

		O2 %	CO2 %	O2 Volts	CO2 Volts
5/13/2021	14:31:26	19.612	0.227	7.855	0.145
5/13/2021	14:32:25	19.614	0.22	7.855	0.141
5/13/2021	14:33:26	19.618	0.215	7.857	0.138
5/13/2021	14:34:25	19.62	0.218	7.858	0.14
5/13/2021	14:35:26	19.625	0.214	7.86	0.138
5/13/2021	14:36:27	19.628	0.22	7.861	0.141
5/13/2021	14:37:25	19.628	0.229	7.861	0.146
5/13/2021	14:38:26	19.631	0.207	7.862	0.134
5/13/2021	14:39:25	19.637	0.202	7.865	0.132
5/13/2021	14:40:26	19.637	0.209	7.865	0.136
5/13/2021	14:41:25	19.637	0.208	7.865	0.135
5/13/2021	14:42:26	19.631	0.215	7.862	0.139
5/13/2021	14:43:25	19.589	0.21	7.845	0.136
5/13/2021	14:44:26	19.593	0.231	7.847	0.147
5/13/2021	14:45:25	19.6	0.25	7.85	0.156
5/13/2021	14:46:26	19.607	0.233	7.853	0.147
5/13/2021	14:47:24	19.611	0.229	7.854	0.146
5/13/2021	14:48:25	19.617	0.223	7.857	0.142
5/13/2021	14:49:26	19.621	0.229	7.858	0.145

Begin calculating run averages

5/13/2021	14:50:51	19.629	0.224	7.862	0.143
5/13/2021	14:51:52	19.634	0.218	7.864	0.14
5/13/2021	14:52:50	19.64	0.211	7.866	0.137
5/13/2021	14:53:51	19.642	0.204	7.867	0.133
5/13/2021	14:54:52	19.644	0.202	7.868	0.132
5/13/2021	14:55:51	19.65	0.219	7.87	0.14
5/13/2021	14:56:51	19.652	0.207	7.871	0.134
5/13/2021	14:57:52	19.655	0.202	7.872	0.132
5/13/2021	14:58:51	19.657	0.204	7.873	0.133
5/13/2021	14:59:51	19.659	0.205	7.874	0.133
5/13/2021	15:00:52	19.663	0.198	7.875	0.13
5/13/2021	15:01:51	19.665	0.198	7.876	0.13
5/13/2021	15:02:52	19.669	0.192	7.878	0.127
5/13/2021	15:03:52	19.672	0.197	7.879	0.13
5/13/2021	15:04:51	19.675	0.191	7.88	0.126
5/13/2021	15:05:52	19.677	0.195	7.881	0.128
5/13/2021	15:06:50	19.678	0.197	7.881	0.13
5/13/2021	15:07:51	19.679	0.182	7.882	0.122
5/13/2021	15:08:52	19.681	0.194	7.882	0.128
5/13/2021	15:09:51	19.683	0.189	7.883	0.126
5/13/2021	15:10:51	19.685	0.19	7.884	0.126
5/13/2021	15:11:52	19.685	0.179	7.884	0.121
5/13/2021	15:12:51	19.687	0.178	7.885	0.12
5/13/2021	15:13:51	19.681	0.184	7.882	0.123

Test Run 1 Begin. STRATA Version 3.2.112

Operator: Greg Essig

Plant Name: Magnitude 7 Metals

Location: Marston, MO. CB2-8

		O2 %	CO2 %	O2 Volts	CO2 Volts	
5/13/2021	15:14:52	19.68	0.192	7.882	0.127	
5/13/2021	15:15:51	19.684	0.21	7.884	0.136	
5/13/2021	15:16:52	19.685	0.177	7.884	0.12	
5/13/2021	15:17:52	19.688	0.176	7.885	0.119	
5/13/2021	15:18:51	19.69	0.193	7.886	0.127	
5/13/2021	15:19:52	19.696	0.183	7.888	0.122	
5/13/2021	15:20:50	19.701	0.179	7.891	0.12	
Average of Test Run		O2 %	CO2 %	O2 %	CO2 %	
	5/13/2021	15:20:55	19.67	0.196	7.878	0.129

Test Run 1 End

Advanced Industrial Resources, Inc.

Cyclonic Flow Absence Verification Field Data

EPA Method 1

Client: Magnitude 7 Metals

Location: Marston, Missouri

Source: Carbon Bake 2 - 8

Test Team: GE, LS, KF

Probe ID: P3-02

C_p: 0.84

t_m (°F): 80

Console ID: C-013

Y_m: 0.901

ΔH_@: 1.737

Assumed B_{ws}: 2%

P_{bar} (in. Hg): 29.70

Date: May 13, 2021

D_s (in.): 11.75

A_s (ft²): 0.753

D_n (in.): 0.210

A_n (ft²): 0.000241

Point	Δp (in. H ₂ O)	α (degrees)
1	0.0	0.0
2	0.0	5.0
3	0.0	5.0
4	0.0	0.0
Change Ports		
1	0.0	0.0
2	0.0	0.0
3	0.0	5.0
4	0.0	0.0

Advanced Industrial Resources, Inc.

Source Description Sheets

Client: Magnitude 7 Metals
Location: Marston, Missouri

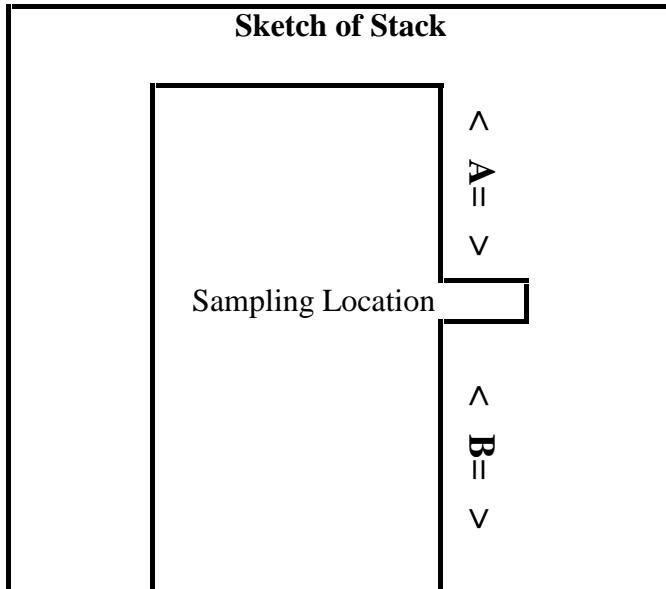
Source: Carbon Bake 2 - 8

D_n (in.): 0.210
A_n (ft²): 0.000241
D_s (in.): 11.75
A_s (ft²): 0.753
Length A: 24
Length B: 97
t_{amb} (°F): 70
Assumed B_{ws}: 2%
P_{bar} (in. Hg): 30.17
P_g (in. H₂O): -0.36
% O₂: 19.0%
% CO₂: 1.0%
Console ID: C-013
Y: 0.901
ΔH_@: 1.737
C_p: 0.84
K-Factor: 1.6

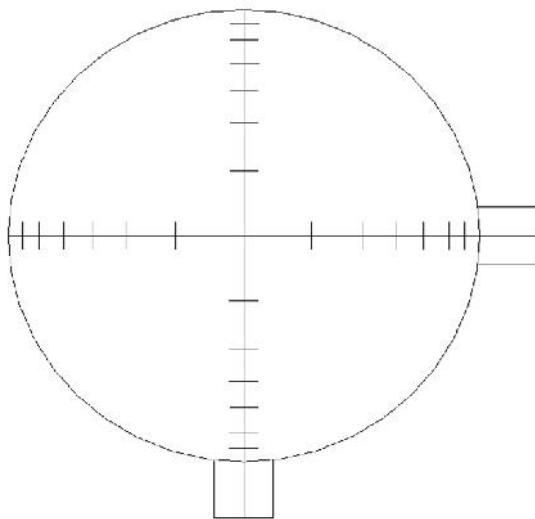
Date: May 13, 2021
Test Team: GE, LS, KF

Point	Δp (in. H ₂ O)	t _s (°F)
1	1.30	205
2	1.30	205
3	1.30	205
4	1.00	205
Change Ports		
1	1.10	205
2	1.20	205
3	1.20	205
4	1.10	205

Digital Photograph of Source Not Available



Traverse Point Locations for Magnitude 7 Metals Carbon Bake 2-8



11.75 Inch Diameter Stack
Two Ports at 90°

Sampling Point	Distance from Stack Wall (inches)
1	0.8
2	2.9
3	8.8
4	11.0

Advanced Industrial Resources, Inc.

Field Data Sheet

Client: MAG F METALS Test Date: 5-13-21
 Location: MARSTON, MO Console ID: C-013
 Source: LBL-8 Y_m / ΔH_o: .901, 1.737
 Test Team: GE, LS, KF Sampling Box ID: B-5
 EPA Methods: J-4, 29 Probe Assembly ID: P3-2
 D_s (in.): 11.75 D_n (in.): .210
 % O₂ 19.67 Assumed B_{ws}: 20%
 % CO₂ 0.2 P_{bar} (in. Hg): 30.17
 Start Run: 1120 P_g (in. H₂O): .36
 End Run: 1144.295 Minutes/Point: 22.5
 Run Number: H(1)KF K-Factor: 1.6

Point	Meter (dcf)	Inches H ₂ O		t _s	Probe	Filter Box	Last Impinger	Temperature Readings (°F)		Filter Exit (MS or CPM)	Vacuum (in. Hg)
		Δp	ΔH					Inlet	Outlet		
1	986.496	1.3	2.08	205	245	248	69	80	80	246	4
2	1005.45	1.2	1.92	204	244	254	65	82	82	251	3
3	1023.55	1.4	2.24	205	252	258	62	83	83	254	4
4	1044.15	1.3	2.08	205	255	258	60	83	83	255	4
5	1065.06	1.3	2.08	205	256	258	61	85	85	255	4
6	1085.25	1.3	2.08	204	255	253	62	86	86	255	4
7	1106.16	1.1	1.76	204	253	252	64	86	86	254	3
8	1124.95	1.2	1.92	205	254	254	64	88	88	251	3
9											
10											
11											
12											
Change Ports											
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
End		<u>1144.295</u>									

Moisture Collected (g)		
	Initial	Final
Body:	<u>400.0</u>	<u>422.0</u>
Silica Gel:	<u>200.0</u>	<u>210.0</u>
Gel Number:		Total: <u>32.0</u>

Pre-Run Leak Checks (defm @ "Hg)
 Sampling Line: ✓ 0.000 @ 8
 Pitot A: ✓
 Pitot B: ✓

Post-Run Leak Checks (defm @ "Hg)
 Sampling Line: 0.001 @ 15
 Pitot A: ✓
 Pitot B: ✓

Silica Gel Desc. (initial): BLUE
 Silica Gel Desc. (final): PINK

Test Team Leader Review: _____
 Data Entry Review: _____

Reagent 1: HNO₃ Lot No: 18397463
 Reagent 2: H₂SO₄ Lot No: 19160074

H₂O₂ - C687108

H₂O - 2036003

HCL - C584901

REV021717

Advanced Industrial Resources, Inc.
Cyclonic Flow Absence Verification Field Data
EPA Method 1

Client: MAG 7 METALS
 Location: MARSTON, MO
 Source: CB2-8
 Test Team: GE, LS, KF
 Probe ID: P3-02
 C_p: 0.84

t_m (°F): 80
 Console ID: C-013
 Y_m: .901
 ΔH_@: 1.737
 Assumed B_{ws}: 2%
 P_{bar} (in. Hg): 30.17

Date: 5-13-21
 D_s (in.): 11.75
 A_s (ft²): .753
 D_n (in.): .210
 A_n (ft²): .000241

Point	Δp (in. H ₂ O)	α (degrees)
1	0.0	0
2	0.0	5
3	0.0	5
4	0.0	0
5	0.0	
6	0.0	
7	0.0	
8	0.0	
9	0.0	
10	0.0	
11	0.0	
12	0.0	

Change Ports		
1	0.0	0
2	0.0	0
3	0.0	5
4	0.0	6
5	0.0	
6	0.0	
7	0.0	
8	0.0	
9	0.0	
10	0.0	
11	0.0	
12	0.0	

Test Team Leader Review: _____
 Data Entry Review: _____

REV021717

Advanced Industrial Resources, Inc.

Source Description Sheets

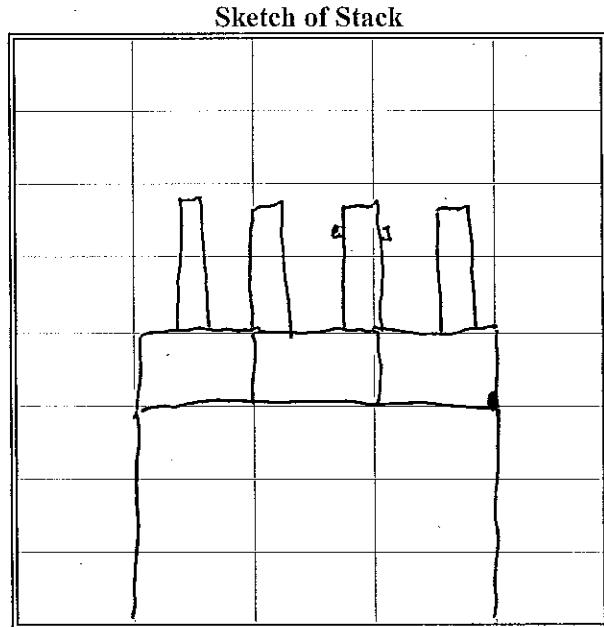
Client: MAG 7 METALS
 Location: MARSTON, MO
 Source: CB2-8

Date: 5-13-21
 Test Team: GE, LS, KF

166

D_n (in.): 0.210
 A_n (ft²): 0.000241
 D_s (in.): 11.75
 A_s (ft²): 0.753
 Length A (in.): 24
 Length B (in.): 97
 t_{amb} (°F): 70
 Assumed B_{ws}: 2%
 P_{bar} (in. Hg): 30.17
 P_g (in. H₂O): - .36
 % O₂: 19
 % CO₂: 1
 Console ID: C-013
 Y: .901
 ΔH_@: 1.737
 C_p: 0.84
 K-Factor: 1.6

Point	Δp (in. H ₂ O)	t _s (°F)
1	1.3	205
2	1.3	205
3	1.3	205
4	1.0	205
5		
6		
7		
8		
9		
10		
11		
12		
Change Ports		
1	1.1	205
2	1.2	205
3	1.2	205
4	1.1	205
5		
6		
7		
8		
9		
10		
11		
12		



Test Team Leader Review: _____

Data Entry Review: _____

CARBON BAKE 3



Run 1

Scrubbers 10 & 12

Visible Emissions Observation Form

SOURCE NAME Magnitude 7 Metals		OBSERVATION DATE 5-11-21				START TIME 12:56		STOP TIME 1:11				
ADDRESS 391 St. Jude Industrial Park		SEC MIN	0	15	30	45	SEC MIN	0	15	30	45	
P.O. Box 395		1	0	0	0	0	31					
CITY Marston		2	0	0	0	0	32					
PHONE 573-643-0023		3	0	0	0	0	33					
PROCESS EQUIPMENT Carbon Bake 3		4	0	0	0	0	34					
CONTROL EQUIPMENT Scrubber + Baghouse		5	0	0	0	0	35					
DESCRIBE EMISSION POINT START		6	0	0	0	0	36					
HEIGHT ABOVE GROUND LEVEL 50		7	0	0	0	0	37					
DISTANCE FROM OBSERVER START 500 STOP		8	0	0	0	0	38					
DESCRIBE EMISSIONS START STOP		9	0	0	0	0	39					
EMISSION COLOR START STOP		10	0	0	0	0	40					
WATER DROPLETS PRESENT: NO <input type="checkbox"/> YES <input checked="" type="checkbox"/>		11	0	0	0	0	41					
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED START STOP		12	0	0	0	0	42					
DESCRIBE BACKGROUND START Clouds STOP		13	0	0	0	0	43					
BACKGROUND COLOR START White smoke		14	0	0	0	0	44					
WIND SPEED START 10 mph STOP		15	0	0	0	0	45					
AMBIENT TEMP START 57°F STOP		16					46					
Source Layout Sketch		17					47					
		18					48					
		19					49					
		20					50					
		21					51					
		22					52					
		23					53					
		24					54					
		25					55					
		26					56					
		27					57					
		28					58					
		29					59					
		30					60					
AVERAGE OPACITY FOR HIGHEST PERIOD						NUMBER OF READINGS ABOVE 20 % WERE 0						
RANGE OF OPACITY READINGS 0 MINIMUM						0 MAXIMUM						
OBSERVER'S NAME (PRINT) Alicia Powell												
COMMENTS Mercury PFC "Air" Testing		OBSERVER'S SIGNATURE Alicia Powell				DATE 5-11-21						
I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS SIGNATURE		CERTIFIED BY:				DATE						
TITLE		DATE				VERIFIED BY:						



SOURCE NAME Magnitude 7 Metals		OBSERVATION DATE 5/12/21					START TIME 955		STOP TIME 1010		
ADDRESS 391 St. Jude Industrial Park		SEC MIN	0	15	30	45	SEC MIN	0	15	30	45
P.O. Box 395		1	0	0	0	0	31				
		2	0	0	0	0	32				
CITY Marston		3	0	0	0	0	33				
PHONE 573-643-0023		4	0	0	0	0	34				
PROCESS EQUIPMENT Carbon Bake 3		5	0	0	0	0	35				
CONTROL EQUIPMENT Scrubbers & Baghouse		6	0	0	0	0	36				
DESCRIBE EMISSION POINT START Top of Stack		7	0	0	0	0	37				
HEIGHT ABOVE GROUND LEVEL 95 ft		8	0	0	0	0	38				
HEIGHT RELATIVE TO OBSERVER START 75 ft STOP		9	0	0	0	0	39				
DISTANCE FROM OBSERVER START 200 ft STOP		10	0	0	0	0	40				
DIRECTION FROM OBSERVER START NW STOP		11	0	0	0	0	41				
DESCRIBE EMISSIONS START STOP		12	0	0	0	0	42				
EMISSION COLOR START STOP		13	0	0	0	0	43				
PLUME TYPE: CONTINUOUS <input type="checkbox"/> FUGITIVE <input type="checkbox"/> INTERMITTENT <input type="checkbox"/>		14	0	0	0	0	44				
WATER DROPLETS PRESENT: NO <input type="checkbox"/> YES <input checked="" type="checkbox"/>		15	0	0	0	0	45				
IF WATER DROPLET PLUME: ATTACHED <input type="checkbox"/> DETACHED <input type="checkbox"/>		16					46				
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED START STOP		17					47				
DESCRIBE BACKGROUND START Sky STOP		18					48				
STOP		19					49				
BACKGROUND COLOR START Blue STOP		20					50				
SKY CONDITIONS START Mostly Clear STOP		21					51				
WIND SPEED START 15 STOP		22					52				
WIND DIRECTION START NE STOP		23					53				
AMBIENT TEMP START 57°F STOP		24					54				
WET BULB TEMP		25					55				
RH.percent		26					56				
Source Layout Sketch		27					57				
		28					58				
		29					59				
		30					60				
AVERAGE OPACITY FOR HIGHEST PERIOD		NUMBER OF READINGS ABOVE 20 % WERE 0									
RANGE OF OPACITY READINGS MINIMUM		MAXIMUM									
OBSERVER'S NAME (PRNT) Nancy Halford											
COMMENTS		OBSERVER'S SIGNATURE Nancy Halford					DATE 5/12/21				
I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS SIGNATURE		CERTIFIED BY:					DATE				
TITLE		VERIFIED BY:					DATE				



AeroMet
Engineering, Inc.
www.aeromet.org

Run #3 Scrubbers 10 + 11

Visible Emissions Observation Form

SOURCE NAME Magnitude 7 Metals		OBSERVATION DATE 5/12/21				START TIME 1149		STOP TIME 1204			
ADDRESS 391 St. Jude Industrial Park		SEC MIN	0	15	30	45	SEC MIN	0	15	30	45
P.O. Box 395		1	0	0	0	0	31				
		2	0	0	0	0	32				
CITY Marston		3	0	0	0	0	33				
PHONE 573-643-0023		4	0	0	0	0	34				
PROCESS EQUIPMENT Carbon Bake 3		5	0	0	0	0	35				
CONTROL EQUIPMENT Scrubbers & Baghouse		6	0	0	0	0	36				
DESCRIBE EMISSION POINT START Top of Stack		7	0	0	0	0	37				
HEIGHT ABOVE GROUND LEVEL 95 ft		8	0	0	0	0	38				
DISTANCE FROM OBSERVER START 100ft STOP		9	0	0	0	0	39				
EMISSION COLOR START STOP		10	0	0	0	0	40				
WATER DROPLETS PRESENT: NO <input type="checkbox"/> YES <input checked="" type="checkbox"/>		11	0	0	0	0	41				
DESCRIBE EMISSIONS START STOP		12	0	0	0	0	42				
PLUME TYPE: CONTINUOUS <input type="checkbox"/> FUGITIVE <input type="checkbox"/> INTERMITTENT <input type="checkbox"/>		13	0	0	0	0	43				
IF WATER DROPLET PLUME: ATTACHED <input type="checkbox"/> DETACHED <input type="checkbox"/>		14	0	0	0	0	44				
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED START STOP		15	0	0	0	0	45				
DESCRIBE BACKGROUND START Sky STOP		16					46				
BACKGROUND COLOR START Blue STOP		17					47				
SKY CONDITIONS START Clear STOP		18					48				
WIND SPEED START 8-15 mph STOP		19					49				
WIND DIRECTION START NW STOP		20					50				
AMBIENT TEMP START 62°F STOP		21					51				
WET BULB TEMP RH.percent		22					52				
Source Layout Sketch		23					53				
		24					54				
		25					55				
		26					56				
		27					57				
		28					58				
		29					59				
		30					60				
AVERAGE OPACITY FOR HIGHEST PERIOD						NUMBER OF READINGS ABOVE 20 % WERE 0					
RANGE OF OPACITY READINGS						MINIMUM		MAXIMUM			
OBSERVER'S NAME (PRINT) Nancy Halford											
COMMENTS		OBSERVER'S SIGNATURE Nancy Halford				DATE 5/12/21					
I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS SIGNATURE		CERTIFIED BY:				DATE					
TITLE		DATE		VERIFIED BY:				DATE			

Advanced Industrial Resources, Inc.

Field Data Sheet

Client: Magnitude 7 Metals
Location: Marston, Missouri
Source: Carbon Bake 3
Test Team: GE, LS, KF
EPA Methods: 1, 2, 3A, 4, 29
D_s (in.): 87.0 X 87.0
% O₂ 19.7
% CO₂ 0.40
Start Run: 11:05 AM
End Run: 2:15 PM
Run Number: 1

Test Date: May 11, 2021
Console ID: C-015
Y_m / ΔH_@: 0.992 1.763
Sampling Box ID: B-012
Probe Assembly ID: P8-02
D_n (in.): 0.385
Assumed B_{ws}: 3.0
P_{bar} (in. Hg): 30.00
p_g (in. H₂O): 0.08
Minutes/Point: 6.0
K-Factor: 19.2

Point	Meter (dcf)	Inches H ₂ O		(Δp) ^{1/2}	Temperature Readings (°F)						Vacuum (in. Hg)
		Δp	ΔH		t _s	Probe	Filter	Last Impinger	t _m Average	Filter Exit	
1	344.199	0.15	2.88	0.387	152	254	257	62	70	240	5
2	350.01	0.14	2.69	0.374	153	251	252	60	70	244	5
3	355.84	0.10	1.92	0.316	153	249	250	57	72	245	4
4	360.59	0.09	1.73	0.300	151	249	251	55	75	247	3
5	365.04	0.08	1.54	0.283	153	230	251	55	75	247	3
6	369.27	0.16	3.07	0.400	155	251	250	53	76	250	5
7	375.26	0.14	2.69	0.374	155	252	249	52	78	249	5
8	380.96	0.11	2.11	0.332	153	251	251	52	78	250	4
9	386.09	0.06	1.15	0.245	154	251	250	52	79	251	3
10	389.83	0.06	1.15	0.245	154	250	249	53	80	251	3
11	393.59	0.15	2.88	0.387	152	248	258	53	80	250	5
12	399.28	0.13	2.49	0.361	153	249	251	53	81	250	5
13	404.800	0.12	2.30	0.346	151	250	251	54	81	249	4
14	410.17	0.09	1.73	0.300	150	250	252	54	81	250	3
15	414.79	0.08	1.54	0.283	150	249	249	55	83	250	3
16	419.11	0.16	3.07	0.400	152	249	249	56	82	249	5
17	425.18	0.16	3.07	0.400	155	250	251	56	83	250	5
18	431.29	0.12	2.30	0.346	152	250	251	55	83	251	4
19	436.69	0.09	1.73	0.300	153	251	249	55	83	250	3
20	441.28	0.09	1.73	0.300	153	251	251	54	84	250	3
21	445.84	0.15	2.88	0.387	154	251	253	54	84	251	5
22	451.72	0.13	2.49	0.361	155	252	250	55	84	250	5
23	457.29	0.10	1.92	0.316	153	250	252	55	84	251	4
24	462.16	0.09	1.73	0.300	152	251	249	56	85	251	4
25	466.76	0.08	1.54	0.283	155	252	254	56	85	251	3
26	471.30	0.16	3.07	0.400	153	253	249	56	85	250	5
27	477.36	0.15	2.88	0.387	154	250	248	57	85	249	5
28	483.32	0.12	2.30	0.346	151	251	249	57	86	249	4
29	488.72	0.10	1.92	0.316	150	250	248	58	86	249	4
30	493.39	0.09	1.73	0.300	153	250	250	59	86	251	3
End		497.975									

Total Moisture Collected (mL): 22.0
Theoretical maximum moisture collection at saturation (ml): 1178.6
Pre System Leak Check (cfm): 0.000
Post System Leak Check (cfm): 0.002

Advanced Industrial Resources, Inc.

Field Data Sheet

Client: Magnitude 7 Metals
Location: Marston, Missouri
Source: Carbon Bake 3
Test Team: GE, LS, KF
EPA Methods: 1, 2, 3A, 4, 29
D_s (in.): 87.0 X 87.0
% O₂ 19.38
% CO₂ 0.47
Start Run: 7:55 AM
End Run: 11:03 AM
Run Number: 2

Test Date: May 12, 2021
Console ID: C-015
Y_m / ΔH_@: 0.992 1.763
Sampling Box ID: B-12
Probe Assembly ID: P8-02
D_n (in.): 0.385
Assumed B_{ws}: 3.0
P_{bar} (in. Hg): 30.00
p_g (in. H₂O): 0.08
Minutes/Point: 6.0
K-Factor: 19.2

Point	Meter (dcf)	Inches H ₂ O			Temperature Readings (°F)							Vacuum (in. Hg)
		Δp	ΔH	(Δp) ^{1/2}	t _s	Probe	Filter	Last Impinger	t _m Average	Filter Exit		
1	499.849	0.09	1.73	0.300	140	230	235	56	58	234	4	
2	504.31	0.10	1.92	0.316	143	248	252	47	60	250	4	
3	509.03	0.11	2.11	0.332	146	250	249	50	62	252	5	
4	513.91	0.14	2.69	0.374	148	250	250	51	64	251	6	
5	519.53	0.14	2.69	0.374	150	251	249	53	65	250	6	
6	525.22	0.08	1.54	0.283	151	252	251	55	66	248	4	
7	529.41	0.08	1.54	0.283	152	250	250	55	67	251	4	
8	533.53	0.13	2.49	0.361	153	251	249	55	68	249	5	
9	538.84	0.14	2.69	0.374	153	251	251	55	69	250	6	
10	544.48	0.15	2.88	0.387	155	249	250	56	70	251	6	
11	550.32	0.10	1.92	0.316	155	250	250	58	72	249	4	
12	555.11	0.12	2.30	0.346	156	250	250	59	72	250	5	
13	560.320	0.12	2.30	0.346	157	248	250	59	73	251	5	
14	565.55	0.15	2.88	0.387	157	249	250	59	73	252	6	
15	571.35	0.15	2.88	0.387	158	249	251	60	73	250	6	
16	577.18	0.08	1.54	0.283	159	250	250	62	74	250	4	
17	581.39	0.10	1.92	0.316	165	250	250	66	80	251	4	
18	586.14	0.10	1.92	0.316	161	251	250	54	75	250	4	
19	590.91	0.16	3.07	0.400	160	252	250	52	75	249	7	
20	596.78	0.16	3.07	0.400	161	250	249	52	76	250	7	
21	602.69	0.09	1.73	0.300	162	251	251	53	78	248	4	
22	607.20	0.09	1.73	0.300	165	252	251	57	81	249	4	
23	611.72	0.12	2.30	0.346	168	250	250	57	83	251	5	
24	616.93	0.14	2.69	0.374	168	251	250	57	82	250	6	
25	622.48	0.15	2.88	0.387	162	250	250	52	78	251	6	
26	628.07	0.08	1.54	0.283	164	250	250	58	83	250	4	
27	632.35	0.08	1.54	0.283	166	250	250	59	87	250	4	
28	636.56	0.12	2.30	0.346	169	249	250	56	80	250	5	
29	641.80	0.14	2.69	0.374	175	248	250	57	86	251	6	
30	647.23	0.15	2.88	0.387	167	250	250	56	80	249	6	
End	652.956											

Total Moisture Collected (mL): 28.0
Theoretical maximum moisture collection at saturation (ml): 1427.4
Pre System Leak Check (cfm): 0.000
Post System Leak Check (cfm): 0.000

Advanced Industrial Resources, Inc.

Field Data Sheet

Client: Magnitude 7 Metals
Location: Marston, Missouri
Source: Carbon Bake 3
Test Team: GE, LS, KF
EPA Methods: 1, 2, 3A, 4, 29
D_s (in.): 87.0 X 87.0
% O₂ 19.38
% CO₂ 0.42
Start Run: 11:25 AM
End Run: 2:32 PM
Run Number: 3

Test Date: May 12, 2021
Console ID: C-015
Ym / DH@: 0.992 1.763
Sampling Box ID: B-012
Probe Assembly ID: P8-02
D_n (in.): 0.385
Assumed Bws: 3.0
Pbar (in. Hg): 30.00
pg (in. H₂O): 0.08
Minutes/Point: 6.0
K-Factor: 19.2

Point	Meter (dcf)	Inches H ₂ O			Temperature Readings (°F)						
		Δp	ΔH	(Δp) ^{1/2}	t _s	Probe	Filter	Last Impinger	t _m Average	Filter Exit	Vacuum (in. Hg)
1	653.029	0.08	1.54	0.283	166	249	253	55	77	246	4
2	657.21	0.09	1.73	0.300	165	250	251	55	78	248	4
3	661.75	0.12	2.30	0.346	170	250	250	55	82	251	5
4	666.99	0.14	2.69	0.374	170	250	249	55	79	250	6
5	672.78	0.14	2.69	0.374	170	251	249	56	79	250	6
6	678.39	0.09	1.73	0.300	170	250	250	56	80	249	4
7	682.98	0.10	1.92	0.316	171	250	250	58	80	250	4
8	687.57	0.13	2.49	0.361	171	250	250	58	80	250	5
9	693.11	0.14	2.69	0.374	171	249	250	60	81	252	6
10	698.77	0.15	2.88	0.387	171	249	251	60	82	250	6
11	704.73	0.10	1.92	0.316	172	250	251	61	82	250	4
12	709.53	0.10	1.92	0.316	172	250	250	61	82	250	4
13	714.320	0.12	2.30	0.346	172	250	250	61	82	248	5
14	719.67	0.15	2.88	0.387	172	251	250	62	83	249	6
15	725.69	0.16	3.07	0.400	172	250	250	58	83	250	7
16	731.79	0.08	1.54	0.283	173	250	250	57	83	250	4
17	736.15	0.09	1.73	0.300	172	250	250	55	84	251	4
18	740.52	0.13	2.49	0.361	172	251	250	55	85	251	5
19	745.29	0.14	2.69	0.374	170	249	251	55	84	250	6
20	751.05	0.16	3.07	0.400	170	249	251	56	84	250	7
21	757.27	0.09	1.73	0.300	170	250	251	56	83	250	4
22	761.86	0.09	1.73	0.300	170	250	251	58	84	249	4
23	766.47	0.13	2.49	0.361	171	250	249	58	84	250	5
24	772.03	0.15	2.88	0.387	171	251	250	55	84	250	6
25	777.97	0.15	2.88	0.387	170	250	250	55	84	251	6
26	783.93	0.08	1.54	0.283	169	251	250	55	81	250	4
27	788.29	0.10	1.92	0.316	173	250	250	55	83	250	4
28	792.55	0.10	1.92	0.316	172	250	249	56	84	251	4
29	796.80	0.13	2.49	0.361	175	250	251	58	85	250	5
30	802.35	0.15	2.88	0.387	173	249	250	59	84	250	6
End		808.328									

Total Moisture Collected (mL): 29.0

Theoretical maximum moisture collection at saturation (ml): 2254.9

Pre System Leak Check (cfm): 0.000

Post System Leak Check (cfm): 0.000

Test Run 1 Begin. STRATA Version 3.2.112

Operator: Greg Essig

Plant Name: Magnitude 7 Metals

Location: Marston, MO. CB3

O2 %	CO2 %	O2 Volts	CO2 Volts
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Begin calculating run averages

5/11/2021	14:34:34	19.672	0.418	7.892	0.118
5/11/2021	14:35:34	19.674	0.42	7.893	0.119
5/11/2021	14:36:34	19.68	0.411	7.895	0.114
5/11/2021	14:37:34	19.683	0.405	7.896	0.111
5/11/2021	14:38:34	19.684	0.412	7.897	0.115
5/11/2021	14:39:34	19.688	0.416	7.898	0.117
5/11/2021	14:40:36	19.691	0.402	7.899	0.11
5/11/2021	14:41:34	19.695	0.388	7.901	0.103
5/11/2021	14:42:35	19.696	0.395	7.902	0.107
5/11/2021	14:43:36	19.697	0.395	7.902	0.106
5/11/2021	14:44:34	19.701	0.388	7.903	0.103
5/11/2021	14:45:36	19.703	0.394	7.904	0.106
5/11/2021	14:46:34	19.705	0.393	7.905	0.105
5/11/2021	14:47:34	19.708	0.397	7.906	0.107
5/11/2021	14:48:34	19.711	0.387	7.907	0.102
5/11/2021	14:49:34	19.716	0.387	7.909	0.102
5/11/2021	14:50:34	19.717	0.391	7.91	0.104
5/11/2021	14:51:34	19.718	0.384	7.91	0.101
5/11/2021	14:52:34	19.722	0.381	7.912	0.099
5/11/2021	14:53:34	19.723	0.378	7.912	0.098

Average of Test Run	O2 %	CO2 %	O2 %	CO2 %	
5/11/2021	14:53:44	19.699	0.397	7.903	0.107

Test Run 1 End

Test Run 2 Begin. STRATA Version 3.2.112

Operator: Greg Essig

Plant Name: Magnitude 7 Metals

Location: Marston, MO. CB3

		O2 %	CO2 %	O2 Volts	CO2 Volts
5/12/2021	11:18:03	19.261	0.476	7.714	0.269
5/12/2021	11:19:04	19.27	0.504	7.718	0.283
5/12/2021	11:20:03	19.279	0.498	7.722	0.28
5/12/2021	11:21:04	19.291	0.508	7.727	0.285
5/12/2021	11:22:05	19.3	0.516	7.73	0.289
5/12/2021	11:23:05	19.312	0.502	7.735	0.282
5/12/2021	11:24:04	19.321	0.506	7.739	0.284
5/12/2021	11:25:04	19.33	0.512	7.742	0.287
5/12/2021	11:26:04	19.336	0.501	7.744	0.281
5/12/2021	11:27:04	19.339	0.494	7.746	0.278
5/12/2021	11:28:04	19.346	0.486	7.748	0.274
5/12/2021	11:29:04	19.355	0.494	7.752	0.278
5/12/2021	11:30:04	19.361	0.486	7.754	0.274
5/12/2021	11:31:04	19.359	0.472	7.754	0.267
5/12/2021	11:32:04	19.358	0.49	7.753	0.276
5/12/2021	11:33:04	19.361	0.503	7.755	0.283
5/12/2021	11:34:04	19.368	0.494	7.757	0.278
5/12/2021	11:35:03	19.369	0.499	7.758	0.281
5/12/2021	11:36:04	19.376	0.483	7.76	0.272
5/12/2021	11:37:03	19.38	0.48	7.762	0.271
5/12/2021	11:38:03	19.384	0.476	7.764	0.269
5/12/2021	11:39:03	19.389	0.475	7.765	0.268
5/12/2021	11:40:03	19.392	0.48	7.767	0.271
5/12/2021	11:41:03	19.394	0.456	7.768	0.259
5/12/2021	11:42:04	19.402	0.457	7.771	0.26
5/12/2021	11:43:04	19.408	0.466	7.773	0.264
5/12/2021	11:44:04	19.407	0.458	7.773	0.26
5/12/2021	11:45:03	19.412	0.474	7.775	0.268
5/12/2021	11:46:03	19.42	0.485	7.778	0.273
5/12/2021	11:47:03	19.423	0.454	7.779	0.258
5/12/2021	11:48:03	19.425	0.446	7.78	0.254
5/12/2021	11:49:03	19.431	0.464	7.782	0.263
5/12/2021	11:50:03	19.436	0.437	7.784	0.25
5/12/2021	11:51:03	19.441	0.432	7.786	0.247
5/12/2021	11:52:03	19.444	0.439	7.788	0.251
5/12/2021	11:53:03	19.446	0.435	7.788	0.249
5/12/2021	11:54:03	19.447	0.433	7.789	0.248
5/12/2021	11:55:03	19.453	0.431	7.791	0.246
5/12/2021	11:56:03	19.459	0.43	7.794	0.246
5/12/2021	11:57:03	19.462	0.42	7.795	0.241
5/12/2021	11:58:03	19.46	0.418	7.794	0.24

Average of Test Run	O2 %	CO2 %	O2 %	CO2 %
5/12/2021 11:58:32	19.382	0.472	7.763	0.267

Test Run 2 End

Test Run 3 Begin. STRATA Version 3.2.112

Operator: Greg Essig

Plant Name: Magnitude 7 Metals

Location: Marston, MO. CB3

		O2 %	CO2 %	O2 Volts	CO2 Volts
5/12/2021	15:02:24	19.285	0.398	7.724	0.23
5/12/2021	15:03:24	19.292	0.492	7.727	0.277
5/12/2021	15:04:23	19.3	0.482	7.73	0.272
5/12/2021	15:05:23	19.309	0.486	7.734	0.274
5/12/2021	15:06:23	19.315	0.472	7.736	0.267
5/12/2021	15:07:23	19.322	0.463	7.739	0.262
5/12/2021	15:08:23	19.329	0.451	7.742	0.256
5/12/2021	15:09:23	19.336	0.46	7.744	0.261
5/12/2021	15:10:23	19.34	0.451	7.746	0.256
5/12/2021	15:11:23	19.345	0.446	7.748	0.254
5/12/2021	15:12:23	19.348	0.44	7.749	0.251
5/12/2021	15:13:23	19.352	0.454	7.751	0.258
5/12/2021	15:14:23	19.356	0.434	7.752	0.248
5/12/2021	15:15:23	19.359	0.432	7.754	0.247
5/12/2021	15:16:23	19.362	0.432	7.755	0.247
5/12/2021	15:17:23	19.367	0.426	7.757	0.244
5/12/2021	15:18:23	19.372	0.443	7.759	0.253
5/12/2021	15:19:22	19.37	0.436	7.758	0.249
5/12/2021	15:20:22	19.375	0.428	7.76	0.245
5/12/2021	15:21:22	19.376	0.428	7.76	0.245
5/12/2021	15:22:23	19.376	0.428	7.76	0.245
5/12/2021	15:23:23	19.38	0.424	7.762	0.243
5/12/2021	15:24:23	19.38	0.424	7.762	0.243
5/12/2021	15:25:23	19.383	0.421	7.763	0.241
5/12/2021	15:26:23	19.385	0.431	7.764	0.246
5/12/2021	15:27:24	19.386	0.425	7.765	0.243
5/12/2021	15:28:24	19.387	0.417	7.765	0.24
5/12/2021	15:29:24	19.391	0.417	7.767	0.24
5/12/2021	15:30:24	19.393	0.414	7.767	0.238
5/12/2021	15:31:24	19.393	0.407	7.767	0.235
5/12/2021	15:32:22	19.395	0.4	7.768	0.231
5/12/2021	15:33:22	19.398	0.407	7.769	0.234
5/12/2021	15:34:22	19.401	0.418	7.77	0.24

Test Run 3 Begin. STRATA Version 3.2.112

Operator: Greg Essig

Plant Name: Magnitude 7 Metals

Location: Marston, MO. CB3

		O2 %	CO2 %	O2 Volts	CO2 Volts
5/12/2021	15:35:23	19.403	0.409	7.771	0.235
5/12/2021	15:36:22	19.404	0.401	7.772	0.232
5/12/2021	15:37:22	19.408	0.396	7.773	0.229
5/12/2021	15:38:22	19.413	0.401	7.775	0.231
5/12/2021	15:39:22	19.412	0.404	7.775	0.233
5/12/2021	15:40:22	19.407	0.394	7.773	0.228
5/12/2021	15:41:22	19.411	0.397	7.774	0.23
5/12/2021	15:42:22	19.413	0.405	7.775	0.233
5/12/2021	15:43:22	19.415	0.398	7.776	0.23
5/12/2021	15:44:22	19.418	0.395	7.777	0.229
5/12/2021	15:45:23	19.423	0.401	7.779	0.232
5/12/2021	15:46:23	19.425	0.394	7.78	0.228
5/12/2021	15:47:23	19.427	0.383	7.781	0.223
5/12/2021	15:48:23	19.431	0.389	7.782	0.225
5/12/2021	15:49:22	19.432	0.391	7.783	0.226
Average of Test Run		O2 %	CO2 %	O2 %	CO2 %
5/12/2021	15:49:39	19.377	0.424	7.761	0.243

Test Run 3 End

Advanced Industrial Resources, Inc.
Cyclonic Flow Absence Verification Field Data
EPA Method 1

Client: Magnitude 7 Metals
Location: Marston, Missouri
Source: Carbon Bake 3
Test Team: GE, LS, KF
Probe ID: P8-02
C_p: 0.84

t_m (°F): 70
Console ID: C-015
Y_m: 0.992
ΔH_@: 1.763
Assumed B_{ws}: 3%
P_{bar} (in. Hg): 30.00

Date: May 11, 2021
D_s (in.): 87.0 x 87.0
A_s (ft²): 52.56
D_n (in.): 0.385
A_n (ft²): 0.00081

Point	Δp (in. H ₂ O)	α (degrees)
1	0.0	0.0
2	0.0	0.0
3	0.0	1.0
4	0.0	0.0
Change Ports		
5	0.0	0.0
6	0.0	0.0
7	0.0	1.0
8	0.0	1.0
Change Ports		
9	0.0	0.0
10	0.0	0.0
11	0.0	0.0
12	0.0	0.0
Change Ports		
13	0.0	0.0
14	0.0	1.0
15	0.0	0.0
16	0.0	0.0
Change Ports		
17	0.0	0.0
18	0.0	1.0
19	0.0	0.0
20	0.0	1.0
Change Ports		
21	0.0	0.0
22	0.0	1.0
23	0.0	1.0
24	0.0	0.0

Advanced Industrial Resources, Inc.

Source Description Sheets

Client: Magnitude 7 Metals
Location: Marston, Missouri
Source: Carbon Bake 3

D_n (in.): 0.385
A_n (ft²): 0.000808
D_s (in.): 87.0 x 87.0
A_s (ft²): 52.56
Length A: 92
Length B: 404
t_{amb} (°F): 70
Assumed B_{ws}: 3%
P_{bar} (in. Hg): 30
P_g (in. H₂O): 0.08
 % O₂: 19.7%
 % CO₂: 0.4%
Console ID: C-015
 Y: 0.992
ΔH_@: 1.763
C_p: 0.84
K-Factor: 19.2

Date: May 11, 2021
Test Team: GE, LS, KF

Point	Δp (in. H ₂ O)	t _s (°F)
1	0.16	152
2	0.16	152
3	0.12	152
4	0.09	152

Change Ports

1	0.09	153
2	0.13	153
3	0.13	152
4	0.10	151

Change Ports

1	0.06	151
2	0.06	152
3	0.12	153
4	0.13	153

Change Ports

1	0.12	152
2	0.09	152
3	0.06	152
4	0.14	152

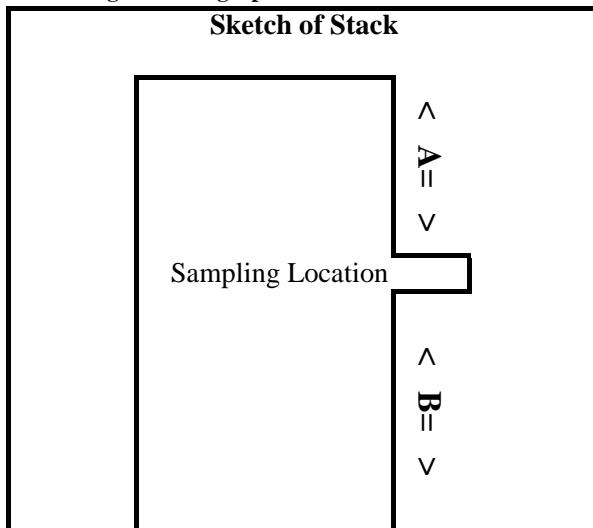
Change Ports

1	0.14	152
2	0.11	151
3	0.08	152
4	0.07	153

Change Ports

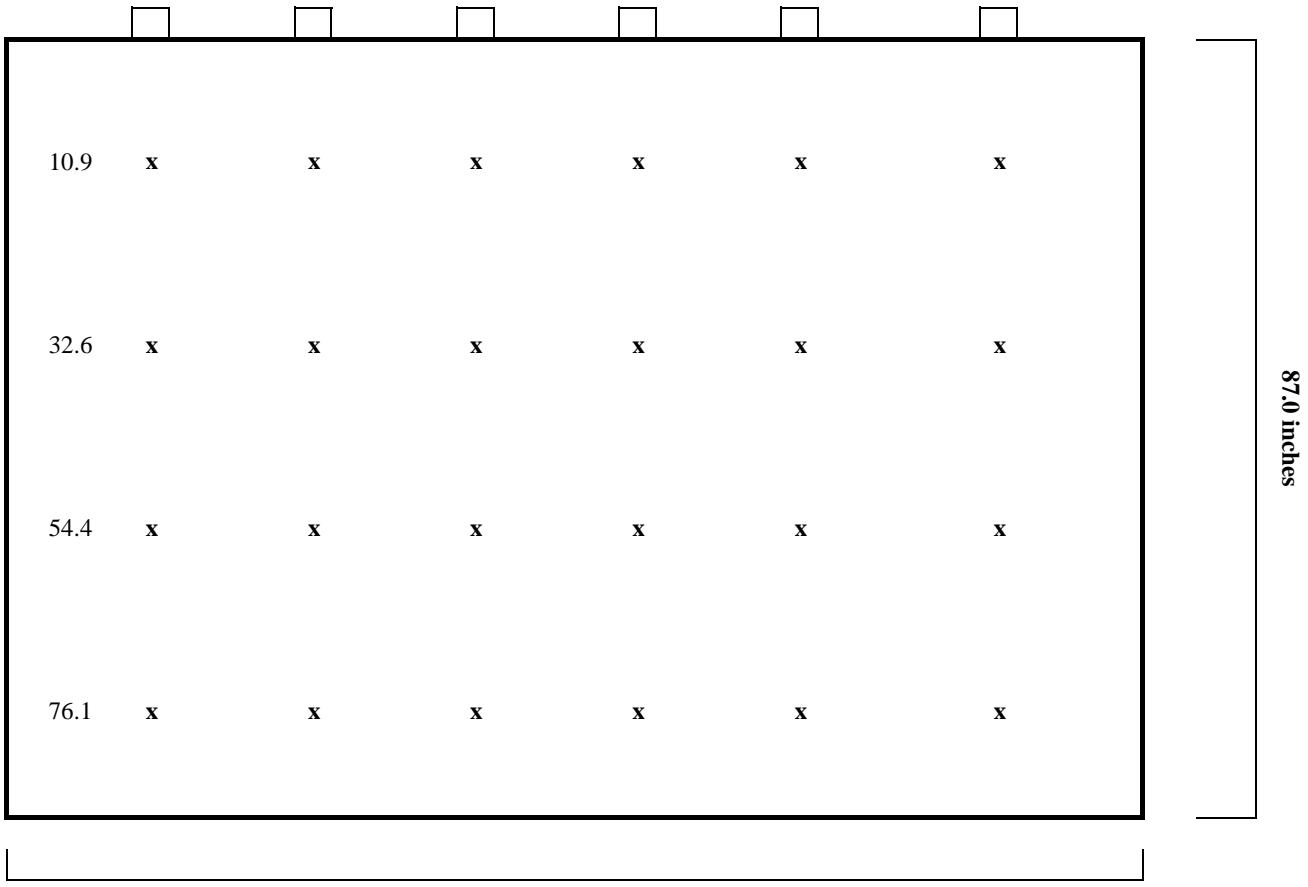
1	0.15	153
2	0.15	153
3	0.12	152
4	0.10	152

Digital Photograph of Source Not Available



Advanced Industrial Resources, Inc.

Traverse Point Locations for Magnitude 7 Metals Carbon Bake 3



Advanced Industrial Resources, Inc.

Field Data Sheet

Client: MAG 7 METALS
 Location: MARSTON, MO
 Source: CB3
 Test Team: GE, LS, KF
 EPA Methods: 1-4, 29
 D_s (in.): 87 x 87
 % O₂: 19.7
 % CO₂: .4
 Start Run: 1105
 End Run: 1415
 Run Number: 1A

Test Date: 5-11-21
 Console ID: C-015
 Y_m / ΔH_g: .992, 1.763
 Sampling Box ID: B-012
 Probe Assembly ID: P10 → P8-02
 D_n (in.): , 385
 Assumed B_{ws}: 3%
 P_{bar} (in. Hg): 30.00
 p_g (in. H₂O): .08
 Minutes/Point: 6
 K-Factor: 19.19

Point	Meter (def)	Inches H ₂ O		t _s	Probe	Filter Box	Last Impinger	Temperature Readings (°F)		Filter Exit (MS or CPM)	Vacuum (in. Hg)
		Δp	ΔH					t _m	Inlet		
1	344.199	.15	2.87	152	254	257	62	70	70	240	5
2	350.01	.14	2.68	153	251	252	60	70	70	244	5
3	355.84	.10	1.99	153	249	250	57	72	72	245	4
4	360.59	.09	1.92	151	249	251	55	75	73	247	3
5	365.04	.08	1.53	153	230	251	55	75	75	247	3
6	369.274	.16	3.07	155	251	250	53	76	76	250	5
7	375.26	.14	2.68	155	252	249	52	78	78	249	5
8	380.96	.11	2.11	153	251	251	52	78	78	250	4
9	386.09	.06	1.15	154	251	250	52	79	79	251	3
10	389.83	.06	1.15	154	250	249	53	80	80	251	3
11	393.593	.15	2.87	152	248	248	53	80	80	250	5
12	399.28	.13	2.49	153	249	251	53	81	81	250	5
Change Ports											
1	404.80	.12	2.30	151	250	251	54	81	81	249	4
2	410.17	.09	1.72	150	250	252	54	81	81	250	3
3	414.79	.08	1.53	150	249	249	55	83	83	250	3
4	419.115	.16	3.07	152	249	249	56	82	82	249	5
5	425.18	.16	3.07	153	250	251	56	83	83	250	45
6	431.29	.12	2.30	152	250	251	55	83	83	251	4
7	436.69	.09	1.72	153	251	249	55	83	83	250	3
8	441.28	.09	1.72	153	251	251	54	84	84	250	3
9	445.838	.15	2.87	154	251	253	54	84	84	251	5
10	451.72	.13	2.46	155	252	250	55	84	84	250	3
11	457.29	.10	1.99	153	250	252	55	84	84	251	4
12	462.16	.09	1.72	152	251	249	56	85	85	251	4
End											

Moisture Collected (g)			
Body:	Initial	Final	Net
Silica Gel:	400.0	415.0	+5.0
Gel Number:	200.0	207.0	+7.0
	1	Total:	22.0

Silica Gel Desc. (initial): blue
 Silica Gel Desc. (final): PINK

Test Team Leader Review: _____
 Data Entry Review: _____

Pre-Run Leak Checks (defm @ "Hg)
 Sampling Line: 0.003 @ 15
 Pitot A: ✓
 Pitot B: ✓

Post-Run Leak Checks (defm @ "Hg)
 Sampling Line: ✓ @
 Pitot A: ✓
 Pitot B: ✓

Reagent 1: HNO₃ Lot No: 18397463
 Reagent 2: H₂SO₄ Lot No: 19160074

H₂O₂ - L687108
 H₂O - 2036003
 HCl - C584401 153.776

Advanced Industrial Resources, Inc.

Field Data Sheet

Client: MAG 7 METALS
 Location: MARSTON, MO
 Source: CB3
 Test Team: GE, LS, KF
 EPA Methods: 1-4, 29
 D_s (in.): 87 x 87
 % O₂: 19.7
 % CO₂: .4
 Start Run: 1105
 End Run: 1415
 Run Number: 1B

Test Date: 5-11-21
 Console ID: L-015
 Y_m / ΔH_o: .992, 1.763
 Sampling Box ID: B-012
 Probe Assembly ID: P0-1 P8-02
 D_a (in.): .385
 Assumed B_{ws}: 3%
 P_{bar} (in. Hg): 30.00
 p_g (in. H₂O): .08
 Minutes/Point: 6
 K-Factor: 19.19

Point	Meter (def)	Inches H ₂ O		t _s	Probe	Filter Box	Last Impinger	Temperature Readings (°F)		Filter Exit (M5 or CPM)	Vacuum (in. Hg)
		Δp	ΔH					Inlet	Outlet		
1	466.76	.08	1.53	155	252	254	56	85	85	251	3
2	471.299	.16	3.07	153	253	249	56	85	85	250	5
3	477.36	.15	2.87	154	250	248	57	85	85	249	5
4	483.32	.12	2.30	151	251	249	57	86	86	249	4
5	488.72	.10	1.99	150	250	248	58	86	86	249	4
6	493.39	.09	1.72	153	250	250	59	86	86	251	3
7											
8											
9											
10											
11											
12											
Change Ports											
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
End	<u>497.975</u>										

Body: Silica Gel: Gel Number:	Moisture Collected (g)		
	Initial	Final	Net
	<u>400</u>	<u>415</u>	<u>15</u>
	<u>200.0</u>	<u>207</u>	<u>7</u>
	Total:		<u>22</u>

Pre-Run Leak Checks (defm @ "Hg)
 Sampling Line: @
 Pitot A: _____
 Pitot B: _____

Post-Run Leak Checks (defm @ "Hg)
 Sampling Line: 0.052 @ 15
 Pitot A: ✓
 Pitot B: ✓

Silica Gel Desc. (initial): _____
 Silica Gel Desc. (final): _____
 Test Team Leader Review: _____
 Data Entry Review: _____

Reagent 1: _____ Lot No: _____
 Reagent 2: _____ Lot No: _____

ap7
Advanced Industrial Resources, Inc.
Field Data Sheet

Client: MAG 7 METALS
 Location: MARSTON, MO
 Source: CB3
 Test Team: GE, LS, KF
 EPA Methods: 1-4, 29
 D_s (in.): 87 x 87
 % O₂: 19.38
 % CO₂: 0.47
 Start Run: 0755
 End Run: 11:03
 Run Number: 2A

Test Date: 5-12-21
 Console ID: L-015
 Y_m / ΔH_g: .992, 1.763
 Sampling Box ID: B-12
 Probe Assembly ID: P8-02
 D_n (in.): .385
 Assumed B_{ws}: 3%
 P_{bar} (in. Hg): 30.00
 p_g (in. H₂O): .08
 Minutes/Point: 6
 K-Factor: 19.19

Point	Meter (def)	Inches H ₂ O		t _s	Probe	Filter Box	Last Impinger	Temperature Readings (°F)		Filter Exit (M5 or CPMD)	Vacuum (in. Hg)
		Δp	ΔH					Inlet	Outlet		
1	499.849	.09	1.72	140	230	235	56	58	58	234	4
2	504.31	.10	1.99	143	248	252	47	60	60	250	4
3	509.03	.11	2.11	146	250	249	50	62	62	252	5
4	513.91	.14	2.68	148	250	250	51	64	64	251	6
5	519.53	.14	2.68	150	251	249	53	65	65	250	6
6	525.218	.08	1.53	151	252	251	55	66	66	248	4
7	529.41	.08	1.53	152	250	250	55	67	67	251	4
8	533.53	.13	2.49	153	251	249	53	68	68	249	5
9	538.84	.14	2.68	153	251	251	55	69	69	250	6
10	544.48	.15	2.87	155	249	250	56	70	70	251	6
11	550.315	.10	1.99	155	250	250	58	72	72	249	4
12	555.11	.12	2.30	156	250	250	54	72	72	250	5

Change Ports											
1	560.32	.12	2.30	157	248	250	59	73	73	251	5
2	565.55	.15	2.87	157	249	250	59	73	73	252	6
3	571.35	.15	2.87	158	249	251	60	73	73	250	6
4	577.178	.08	1.53	159	250	250	62	74	74	250	4
5	581.39	.10	1.99	165	250	250	66	80	80	251	4
6	586.14	.10	1.99	161	251	250	54	75	75	250	4
7	590.91	.16	3.07	160	252	250	52	75	75	249	7
8	596.78	.16	3.07	161	250	249	52	76	76	250	7
9	602.687	.09	1.72	162	251	251	53	78	78	248	4
10	607.20	.09	1.72	163	252	251	57	81	81	249	4
11	611.72	.12	2.30	168	250	250	57	83	83	251	5
12	616.93	.14	2.68	168	251	250	57	82	82	250	6
End											

Moisture Collected (g)		
Body:	Initial	Final
Silica Gel:	400	422.0
Gel Number:	200.0	6.0
	Total:	28.6

Silica Gel Desc. (initial): BLUE
 Silica Gel Desc. (final): PINK

Test Team Leader Review: _____
 Data Entry Review: _____

Pre-Run Leak Checks (defm @ "Hg)
 Sampling Line: 0.001@15
 Pitot A: ✓
 Pitot B: ✓

Post-Run Leak Checks (defm @ "Hg)
 Sampling Line: ✓ @15
 Pitot A: ✓
 Pitot B: ✓

Reagent 1: HNO₃ Lot No: 18397463
 Reagent 2: H₂SO₄ Lot No: J9160074

H₂O₂ - C687108

H₂O - 2036003

HCL - L584901

REV021717

Advanced Industrial Resources, Inc.

Field Data Sheet

Client: MAG 7 METALS
 Location: MARSTON, MO
 Source: CB3
 Test Team: GE, LS, KF
 EPA Methods: 1-4, 29
 D_s (in.): 87 x 87
 % O₂: 19.38
 % CO₂: 0.47
 Start Run: 0755
 End Run: 1103
 Run Number: 2D
 Test Date: 5-12-21
 Console ID: C-015
 Y_m / ΔH_@: .992, 1.763
 Sampling Box ID: B-012
 Probe Assembly ID: P8-02
 D_n (in.): .385
 Assumed B_{ws}: 3%
 P_{bar} (in. Hg): 30.00
 p_g (in. H₂O): .08
 Minutes/Point: 6
 K-Factor: 19.19

Point	Meter (def)	Inches H ₂ O		t _s	Probe	Filter Box	Last Impinger	Temperature Readings (°F)		Filter Exit (M5 or CPM)	Vacuum (in. Hg)
		Δp	ΔH					t _m	Inlet		
1	622.48	.15	2.87	162	250	250	52	78	78	251	6
2	628.074	.08	1.53	164	250	250	58	83	83	250	4
3	632.35	.08	1.53	165	250	250	59	87	87	250	4
4	636.56	.12	2.30	169	249	250	56	80	80	250	5
5	641.80	.14	2.68	175	248	250	57	86	86	251	6
6	647.23	.15	2.87	167	250	250	56	80	80	249	6
7											
8											
9											
10											
11											
12											
Change Ports											
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
End	652.956										

Moisture Collected (g)		
Body:	Initial	Final
Silica Gel:	400.0	422.0
Gel Number:	200.0	206.0
	Total:	22.0
		28.0

Pre-Run Leak Checks (defm @ "Hg)
 Sampling Line: ✓ @ 15
 Pitot A: ✓
 Pitot B: ✓

Post-Run Leak Checks (defm @ "Hg)
 Sampling Line: 0.003 @ 15
 Pitot A: ✓
 Pitot B: ✓

Silica Gel Desc. (initial): BLUE
 Silica Gel Desc. (final): PINK

Test Team Leader Review: _____
 Data Entry Review: _____

Reagent 1: _____ Lot No: _____
 Reagent 2: _____ Lot No: _____

REV021717

153.107

Advanced Industrial Resources, Inc.

Field Data Sheet

Client: MAG 7 METALS
 Location: MARSTON, MO
 Source: CD3
 Test Team: GE, LS, KP
 EPA Methods: 1-4, 29
 D_s (in.): 87 x 87
 % O₂: 19.38
 % CO₂: 0.42
 Start Run: 1125
 End Run: 1432
 Run Number: 3A

Test Date: 5-12-21
 Console ID: L-015
 Y_m / ΔH_@: .992, 1.763
 Sampling Box ID: B-012
 Probe Assembly ID: PY-02
 D_n (in.): .385
 Assumed B_{ws}: 3%
 P_{bar} (in. Hg): 30.00
 p_g (in. H₂O): .08
 Minutes/Point: 6
 K-Factor: 19.19

Point	Meter (def)	Inches H ₂ O		Temperature Readings (°F)						Filter Exit (M5 or CPM)	Vacuum (in. Hg)
		Δp	ΔH	t _s	Probe	Filter Box	Last Impinger	t _m			
								Inlet	Outlet		
1	653.029	.08	1.53	166	249	253	55	77	77	246	4
2	657.21	.09	1.72	165	250	251	55	78	78	248	4
3	661.71	.12	2.30	170	250	250	55	82	82	251	5
4	666.99	.14	2.68	170	250	249	55	79	79	250	6
5	672.78	.14	2.68	170	251	249	56	79	79	250	6
6	678.385	.09	1.72	170	250	250	56	90	80	249	4
7	682.98	.10	1.99	171	250	250	58	80	80	250	4
8	687.57	.13	2.49	171	250	250	58	80	80	256	5
9	693.11	.14	2.68	171	249	250	60	81	81	252	6
10	698.77	.15	2.87	171	249	251	60	82	82	250	6
11	704.725	.10	1.99	172	250	251	61	82	82	250	4
12	709.53	.10	1.99	171	250	250	61	82	82	250	4
Change Ports											
1	714.32	.12	2.30	172	250	250	61	82	82	248	5
2	719.67	.15	2.87	172	251	250	62	83	83	249	6
3	725.69	.16	3.07	172	250	250	58	83	83	250	7
4	731.785	.08	1.53	173	250	250	57	83	83	250	4
5	736.15	.09	1.72	172	250	250	55	84	84	251	4
6	740.52	.13	2.49	172	251	250	55	85	85	251	5
7	745.29	.14	2.68	170	249	251	55	84	84	250	6
8	751.05	.16	3.07	170	249	251	56	84	84	250	7
9	757.268	.01	1.72	170	250	251	56	83	83	250	4
10	761.86	.09	1.72	170	250	251	53	84	84	249	4
11	766.47	.13	2.49	171	250	249	58	84	84	250	5
12	772.03	.15	2.87	171	251	250	55	84	84	250	6
End											

	Moisture Collected (g)		
	Initial	Final	Net
Body:	400.0	422.0	22.0
Silica Gel:	200.0	207.0	7.0
Gel Number:		Total:	29.0

Pre-Run Leak Checks (defm @ "Hg)
 Sampling Line: 0.000 @ 15

Pitot A: ✓
 Pitot B: ✓

Post-Run Leak Checks (defm @ "Hg)
 Sampling Line: 0.000 @ 16

Pitot A: ✓
 Pitot B: ✓

Silica Gel Desc. (initial): BLUE
 Silica Gel Desc. (final): PINK

Test Team Leader Review: _____
 Data Entry Review: _____

Reagent 1: HNO₃ Lot No: 18397463
 Reagent 2: H₂SO₄ Lot No: 19160074

$\text{H}_2\text{O}_2 - \text{C}687108$
 $\text{H}_2\text{O}-2036003$
 $\text{HCl} - \text{C}584901$

REV021717

Advanced Industrial Resources, Inc.

Field Data Sheet

Client: MAG 7 METALS
 Location: MARSTON, MO
 Source: C83
 Test Team: GE, LS, KF
 EPA Methods: 1-4, 29
 D_s (in.): 87 x 87
 % O₂: 19.39
 % CO₂: 0.42
 Start Run: 1125
 End Run: 1432
 Run Number: 30
 Test Date: 5-12-21
 Console ID: C-015
 Y_m / ΔH@: .992, 1.763
 Sampling Box ID: B-012
 Probe Assembly ID: PB-02
 D_n (in.): .385
 Assumed B_{ws}: 3%
 P_{bar} (in. Hg): 30.00
 p_g (in. H₂O): .08
 Minutes/Point: 6
 K-Factor: 19.19

Point	Meter (def)	Inches H ₂ O		t _s	Probe	Filter Box	Last Impinger	Temperature Readings (°F)		Filter Exit (MS or CPM)	Vacuum (in. Hg)
		Δp	ΔH					t _m	Inlet		
1	777.97	.15	2.87	170	250	250	55	84	84	251	6
2	783.925	.08	1.83	169	251	250	55	81	81	250	4
3	788.29	.10	1.99	173	250	250	55	83	83	250	4
4	792.55	.10	1.99	172	250	249	56	84	84	251	4
5	796.80	.13	2.49	175	250	251	58	85	85	250	5
6	802.35	.15	2.87	173	249	250	59	84	84	250	6
7											
8											
9											
10											
11											
12											
Change Ports											
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
End	<u>808.328</u>										

Moisture Collected (g)

	Initial	Final	Net
Body:	<u>400</u>	<u>422</u>	<u>22</u>
Silica Gel:	<u>200.0</u>	<u>207</u>	<u>7</u>
Gel Number:		Total:	<u>29</u>

Pre-Run Leak Checks (defm @ "Hg)

Sampling Line: _____ @
 Pitot A: _____
 Pitot B: _____

Post-Run Leak Checks (defm @ "Hg)

Sampling Line: _____ @
 Pitot A: _____
 Pitot B: _____

Silica Gel Desc. (initial): BLUE

Silica Gel Desc. (final): _____

Test Team Leader Review: _____

Data Entry Review: _____

Reagent 1: _____ Lot No: _____

Reagent 2: _____ Lot No: _____

Advanced Industrial Resources, Inc.
Cyclonic Flow Absence Verification Field Data
EPA Method 1

Client: MAG 7 METALS
 Location: MARSTON, MO
 Source: LB3
 Test Team: GE, LS, KP
 Probe ID: P8-02
 C_p: 0.84

t_m (°F): 70
 Console ID: L-015
 Y_m: .992
 ΔH_@: 1,763
 Assumed B_{ws}: 3%
 P_{bar} (in. Hg): 30.60

Date: 5-11-21
 D_s (in.): 87 x 87
 A_s (ft²): 52.56
 D_n (in.): .385
 A_n (ft²): 0.000808

Point	Δp (in. H ₂ O)	α (degrees)
1	0.0	0
2	0.0	0
3	0.0	1
4	0.0	0
5	0.0	0
6	0.0	0
7	0.0	1
8	0.0	1
9	0.0	0
10	0.0	0
11	0.0	0
12	0.0	0

Change Ports		
1	0.0	0
2	0.0	1
3	0.0	0
4	0.0	0
5	0.0	0
6	0.0	1
7	0.0	0
8	0.0	1
9	0.0	0
10	0.0	1
11	0.0	1
12	0.0	0

Test Team Leader Review: _____
 Data Entry Review: _____

Advanced Industrial Resources, Inc.

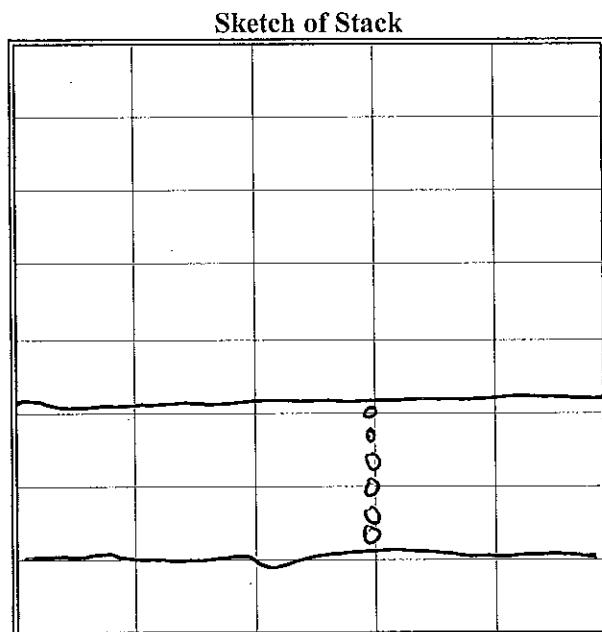
Source Description Sheets

Client: MAGNITUDE 7 METALS
 Location: MARSTON, MO
 Source: CB3

Date: 5-11-21
 Test Team: GE, LS, KF

D_n (in.): .385
 A_n (ft^2): 0.000808
 D_s (in.): 87 x 87
 A_s (ft^2): 52.56
 Length A (in.): 92
 Length B (in.): 404

t_{amb} ($^{\circ}\text{F}$): 70
 Assumed B_{ws} : 3%
 P_{bar} (in. Hg): 30.00
 P_g (in. H_2O): .08
 % O_2 : 19.7
 % CO_2 : .4
 Console ID: C-015
 Y: .992
 $\Delta H_{@}$: 1.763
 C_p : 0.84
 K-Factor: 19.19



Point	Δp (in. H_2O)	t_s ($^{\circ}\text{F}$)
1	.16	152
2	.16	152
3	.12	152
4	.09	152
5	.09	153
6	.13	153
7	.13	152
8	.10	151
9	.06	151
10	.06	152
11	.12	153
12	.13	153

Change Ports		
1	.12	152
2	.09	152
3	.06	152
4	.14	152
5	.14	152
6	.11	151
7	.08	152
8	.07	153
9	.15	153
10	.15	153
11	.12	152
12	.10	152

Test Team Leader Review: _____
 Data Entry Review: _____

APPENDIX E

LABORATORY REPORTS

Advanced Industrial Resources, Inc.

3407 Novis Pointe
Acworth, GA 30101

Project ID: Magnitude 7 Metals

Mercury

EPA Method 29 Analysis

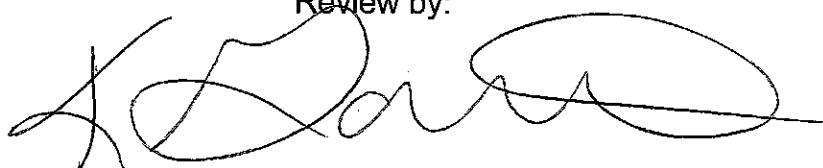
Analytical Report
36718



Element One, Inc.
6319-D Carolina Beach Rd., Wilmington, NC 28412
910-793-0128 FAX: 910-792-6853 e1lab@e1lab.com

The following data for Analytical Report 36718
has been reviewed for completeness, accuracy,
adherence to method protocol,
and compliance with quality assurance guidelines.

Review by:



Katie Gattis, Quality Assurance Officer
May 28, 2021

Report Reviewed and Finalized By:



Ken Smith, Laboratory Director
May 28, 2021

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Certification: NJ NELAP NC009
36718 AIR M29 Report Packet
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SUMMARY OF RESULTS

Summary of Analysis

Summary of Method 29 Mercury Analysis

Run Number		Average Total Catch, µg	Front Half µg	H ₂ O ₂ /HNO ₃ µg	Empty Impinger µg	KMnO ₄ µg	HCl µg
CB3-M29-R1	#1	0.447	< 0.1	< 0.3	< 0.2	< 0.5	0.459
	#2		< 0.1	< 0.3	< 0.2	< 0.5	0.435
CB3-M29-R2	#1	0.444	< 0.1	< 0.3	< 0.2	< 0.5	0.444
	#2		< 0.1	< 0.3	< 0.2	< 0.5	0.443
CB3-M29-R2 dup	#1	0.428	< 0.1	< 0.3	< 0.2	< 0.5	0.439
	#2		< 0.1	< 0.3	< 0.2	< 0.5	0.417
CB3-M29-R3	#1	0.548	< 0.1	< 0.3	< 0.2	< 0.5	0.550
	#2		< 0.1	< 0.3	< 0.2	< 0.5	0.546
CB2-5-M29-R1	#1	0.483	< 0.1	< 0.3	< 0.2	< 0.5	0.478
	#2		< 0.1	< 0.3	< 0.2	< 0.5	0.488
CB2-5-M29-R1 dup	#1	0.520	< 0.1	< 0.3	< 0.2	< 0.5	0.516
	#2		< 0.1	< 0.3	< 0.2	< 0.5	0.523
CB2-6-M29-R1	#1	0.612	< 0.1	< 0.3	< 0.2	< 0.5	0.604
	#2		< 0.1	< 0.3	< 0.2	< 0.5	0.620
CB2-6-M29-R1 dup	#1	0.604	< 0.1	< 0.3	< 0.2	< 0.5	0.609
	#2		< 0.1	< 0.3	< 0.2	< 0.5	0.599
CB2-7-M29-R1	#1	0.626	< 0.1	< 0.3	< 0.2	< 0.5	0.639
	#2		< 0.1	< 0.3	< 0.2	< 0.5	0.613
CB2-7-M29-R1 dup	#1	0.584	< 0.1	< 0.3	< 0.2	< 0.5	0.584
	#2		< 0.1	< 0.3	< 0.2	< 0.5	0.585
CB2-8-M29-R1	#1	0.543	< 0.1	< 0.3	< 0.2	< 0.5	0.551
	#2		< 0.1	< 0.3	< 0.2	< 0.5	0.534
CB2-8-M29-R1 dup	#1	0.564	< 0.1	< 0.3	< 0.2	< 0.5	0.580
	#2		< 0.1	< 0.3	< 0.2	< 0.5	0.547
Reagent Blank	#1	< 0.5	< 0.1	< 0.2	< 0.2	< 0.5	< 0.4
	#2		< 0.1	< 0.2	< 0.2	< 0.5	< 0.4

ANALYTICAL NARRATIVE

Element One Analytical Narrative

Client:	Advanced Industrial Resources, Inc.	Element One #:	36718
Client ID:	Magnitude 7 Metals	Analyst:	RMH
Method:	Method 29	Dates Received:	05/18/21
Analytes:	Hg	Dates Analyzed:	05/26-27/21

Summary of Analysis

The Method 29 samples were digested, prepared, and analyzed according to Method 29 protocol. Samples were analyzed for mercury on a PerkinElmer FIMS-100 CVAA mercury analyzer.

Detection Limits

The FIMS-100 CVAA instrument reporting limit for mercury was 0.004 µg per aliquot analyzed.

Analysis QA/QC

Duplicate analyses relative percent difference (RPD) and spike sample recovery data are summarized in the Quality Control Section. All QA/QC data was within the criteria of the method.

Additional Comments

The reported results have not been corrected for any blank values or spike recovery values. The reported results relate only to the items tested or calibrated.

QUALITY CONTROL SUMMARY

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Summary of Quality Control Data

Mercury Duplicate Injection RPD

(Method 29 QC limits: < 10% for RPD)

Run Number	Front Half	H ₂ O ₂ /HNO ₃	Empty Imp	KMnO ₄	HCl
CB3-M29-R1	NA	NA	NA	NA	5.5%
CB3-M29-R2	NA	NA	NA	NA	0.2%
CB3-M29-R2 dup	NA	NA	NA	NA	5.1%
CB3-M29-R3	NA	NA	NA	NA	0.8%
CB2-5-M29-R1	NA	NA	NA	NA	2.2%
CB2-5-M29-R1 dup	NA	NA	NA	NA	1.4%
CB2-6-M29-R1	NA	NA	NA	NA	2.6%
CB2-6-M29-R1 dup	NA	NA	NA	NA	1.6%
CB2-7-M29-R1	NA	NA	NA	NA	4.1%
CB2-7-M29-R1 dup	NA	NA	NA	NA	0.2%
CB2-8-M29-R1	NA	NA	NA	NA	3.2%
CB2-8-M29-R1 dup	NA	NA	NA	NA	5.8%
Reagent Blank	NA	NA	NA	NA	NA

Mercury Duplicate Analysis RPD

(Method 29 QC limits: < 20% for RPD)

Run Number	Front Half	H ₂ O ₂ /HNO ₃	Empty Imp	KMnO ₄	HCl
CB3-M29-R2 dup	NA	NA	NA	NA	3.6%
CB2-5-M29-R1 dup	NA	NA	NA	NA	7.3%
CB2-6-M29-R1 dup	NA	NA	NA	NA	1.4%
CB2-7-M29-R1 dup	NA	NA	NA	NA	6.9%
CB2-8-M29-R1 dup	NA	NA	NA	NA	3.8%

Summary of Quality Control Data

Mercury Spike Recoveries (Method 29 QC limits: 75-125% for Spike Recoveries)

Run Number		Front Half	H ₂ O ₂ /HNO ₃	Empty Imp	KMnO ₄	HCl
CB3-M29-R3	#1	103%	106%	97%	98%	97%
	#2	100%	106%	96%	97%	96%
CB2-5-M29-R1	#1	106%	103%	98%	95%	101%
	#2	105%	101%	97%	94%	100%
CB2-6-M29-R1	#1	98%	100%	96%	91%	98%
	#2	97%	98%	94%	90%	98%
CB2-7-M29-R1	#1	106%	108%	99%	96%	96%
	#2	106%	107%	97%	95%	96%
CB2-8-M29-R1	#1	100%	101%	104%	96%	110%
	#2	98%	100%	102%	94%	109%

SAMPLE CUSTODY

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Advanced Industrial Resources, Inc.
Compliance Sample Custody Record

36718

Client: Magnitude 7 Metals
Marsion, MO.

FTH/ BH Combined

Sample ID	Date	Source	Description	Matrix		Comments
				Method 29	Sample Condition	
KRI0743_1	5/11/2021	CB3	T1 Container 1	M5	X	
KRI0743_2	5/11/2021	CB3	T1 Container 3	M5	X	
KRI0743_3	5/11/2021	CB3	T1 Container 4	M5	X	
KRI0743_4	5/11/2021	CB3	T1 Container 5A	M5	X	
KRI0743_5	5/11/2021	CB3	T1 Container 5B	M5	X	
KRI0743_6	5/11/2021	CB3	T1 Container 5C	M5	X	
KRI0743_7	5/12/2021	CB3	T2 Container 1	M5	X	
KRI0743_8	5/12/2021	CB3	T2 Container 3	M5	X	
KRI0743_9	5/12/2021	CB3	T2 Container 4	M5	X	
KRI0743_10	5/12/2021	CB3	T2 Container 5A	M5	X	
KRI0743_11	5/12/2021	CB3	T2 Container 5B	M5	X	
KRI0743_12	5/12/2021	CB3	T2 Container 5C	M5	X	
KRI0743_13	5/12/2021	CB3	T3 Container 1	M5	X	
KRI0743_14	5/12/2021	CB3	T3 Container 3	M5	X	
KRI0743_15	5/12/2021	CB3	T3 Container 4	M5	X	
KRI0743_16	5/12/2021	CB3	T3 Container 5A	M5	X	
KRI0743_17	5/12/2021	CB3	T3 Container 5B	M5	X	
KRI0743_18	5/12/2021	CB3	T3 Container 5C	M5	X	
Relinquished By/Sign:	Date/Time	Received By / Sign:	Relinquished By / Sign:	Date/Time	Received By / Sign:	Comments
<i>Willie B. Essig</i>	5/17/21 11:00	<i>John Ruth S. & 103</i>				Received By / Sign:
Field Team Members:	GE KFLS					Analyses To Be Performed By:
AIR Field Supervisor:						Element One
Field Supervisor Sign:						6319 D Carolina Beach Rd
AIR Contact Name:						Wilmington, NC
AIR Contact Number:						910-793-0128

Samples received in good condition. No expiry concerns.

Advanced Industrial Resources, Inc.
Compliance Sample Custody Record

36718

Client: Magnitude 7 Metals
Marston, MO.

Sample ID	Date	Source	Description	Matrix		Comments
				Method 29	Sample Condition	
KR10743	19	5/11/2021	CB2-5	T1 Container 1	M5	X
KR10743	20	5/11/2021	CB2-5	T1 Container 3	M5	X
KR10743	21	5/11/2021	CB2-5	T1 Container 4	M5	X
KR10743	22	5/11/2021	CB2-5	T1 Container 5A	M5	X
KR10743	23	5/11/2021	CB2-5	T1 Container 5B	M5	X
KR10743	24	5/11/2021	CB2-5	T1 Container 5C	M5	X
KR10743	25	5/11/2021	CB2-6	T1 Container 1	M5	X
KR10743	26	5/11/2021	CB2-6	T1 Container 3	M5	X
KR10743	27	5/11/2021	CB2-6	T1 Container 4	M5	X
KR10743	28	5/11/2021	CB2-6	T1 Container 5A	M5	X
KR10743	29	5/11/2021	CB2-6	T1 Container 5B	M5	X
KR10743	30	5/11/2021	CB2-6	T1 Container 5C	M5	X
Relinquished By/Sign:		Date/Time	Received By / Sign:	Relinquished By / Sign:	Date/Time	Received By / Sign:
<u>Jeffrey</u>		5/12/2021 11:40	<u>Greg Essig</u>	<u>Jeffrey</u>		
Field Team Members:						
GE KF LS						
Analyses To Be Performed By:						
Element One						
AIR Field Supervisor:						
Field Supervisor Sign:						
AIR Contact Name:						
AIR Contact Number:						

36718

Advanced Industrial Resources, Inc.
Compliance Sample Custody Record

Client: Magnitude 7 Metals
Marston, MO.

Analysis Desired:
Melted 29
Sample Condition:
FH/BII Combined

Sample ID	Date	Source	Description	Matrix	Comments
KRL0743	31	5/13/2021	CB2-7	T1 Container 1	M5 x
KRL0743	32	5/13/2021	CB2-7	T1 Container 3	M5 x
KRL0743	33	5/13/2021	CB2-7	T1 Container 4	M5 x
KRL0743	34	5/13/2021	CB2-7	T1 Container 5A	M5 x
KRL0743	35	5/13/2021	CB2-7	T1 Container 5B	M5 x
KRL0743	36	5/13/2021	CB2-7	T1 Container 5C	M5 x
KRL0743	37	5/13/2021	CB2-8	T1 Container 1	M5 x
KRL0743	38	5/13/2021	CB2-8	T1 Container 3	M5 x
KRL0743	39	5/13/2021	CB2-8	T1 Container 4	M5 x
KRL0743	40	5/13/2021	CB2-8	T1 Container 5A	M5 x
KRL0743	41	5/13/2021	CB2-8	T1 Container 5B	M5 x
KRL0743	42	5/13/2021	CB2-8	T1 Container 5C	M5 x
KRL0743	43	5/13/2021	CB2&3	Container 8A	0.1N HNO3 blank
KRL0743	44	5/13/2021	CB2&3	Container 8B	M5 x
KRL0743	45	5/13/2021	CB2&3	Container 9	M5 x
KRL0743	46	5/13/2021	CB2&3	Container 10	M5 x
KRL0743	47	5/13/2021	CB2&3	Container 11	M5 x
KRL0743	48	5/13/2021	CB2&3	Container 12	M5 x

Relinquished By/Sign:	Date/Time	Received By / Sign:	Date/Time	Received By / Sign:
<u>Walt Bragg</u>	<u>5/17/21 11:00</u>	<u>John Bragg</u>	<u>5/18,21/05</u>	<u>John Bragg</u>
Field Team Member:		GEE KFLS		Analyses To Be Performed By:
AIR Field Supervisor:		Craig Essig		Element One
Field Supervisor Sign:		<u>Craig Essig</u>		6319 D Carolina Beach Rd
AIR Contact Name:		<u>Derek Stephens</u>		Wilmington, NC
AIR Contact Number:		<u>(404) 843-2100</u>		910-793-0128

ANALYTICAL DATA

Analytical Calculations

Mercury-

$$\text{Mercury Results } (\mu\text{g}) = \frac{\text{CVAA Results } (\mu\text{g})}{\text{Aliquot } (\text{ml})} * \text{Final Volume } (\text{ml})$$

Where-

CVAA Results= Raw sample reading (μg)--*Hg-Data Sheet*

Aliquot= Sample Aliquot (Alq.)--*Hg-Data Sheet*

Final Volume=Final Volume (FV)*--*Sample Submission*
* With the exception of the BH fraction where-
=Received Volume (BV)--*Sample Submission*

Analytical Calculations

Spike Recovery-

$$\text{Spike (\%)} = \frac{(\text{Spiked Result (\mu g)} - \text{Sample Result (\mu g)})}{\text{Spike Amount (\mu g)}} \times 100$$

Where-

Spike Result = Raw sample concentration (μg)--*Hg-Data Sheet*

Sample Result = Raw sample concentration (μg)--*Hg-Data Sheet*

Spike Amount-- *Hg-Data Sheet*

Duplicate Analysis RPD-

$$\text{RPD (\%)} = \frac{(\text{Duplicate Result (\mu g)} - \text{Sample Result (\mu g)})}{\text{Average (\mu g)}} \times 100$$

Where-

Sample Result and Duplicate Results=Raw sample concentration (μg) -- *Hg-Data Sheet*

Average= $\frac{(\text{Duplicate} + \text{Sample Results})}{2}$

elementOne AIR TESTING SAMPLE SUBMISSION FORM Lab ID 36718

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Analysis Due Date 05.26.21
QA/QC/Report Due Date 05.28.21

Client	Advanced Industrial Resources, Inc.
Project ID	Magnitude 7 Metals

Date Received 05.18.21
Time Received 1035

HNO ₃ Lot: 10233	HF Lot: 51901	HCl Lot: 25A095	Ref. Method:
Volume Marked Y/N	Volume Loss Y/N		29

Sample Identification

1	CB3-M29-R1	4	CB2-5-M29-R1	6	CB2-7-M29-R1
2	CB3-M29-R2		CB2-5-M29-R1 Duplicate		CB2-7-M29-R1 Duplicate
	CB3-M29-R2 Duplicate		CB2-5-M29-R1 Spike		CB2-7-M29-R1 Spike
3	CB3-M29-R3	5	CB2-6-M29-R1	7	CB2-8-M29-R1
	CB3-M29-R3 Spike		CB2-6-M29-R1 Duplicate		CB2-8-M29-R1 Duplicate
			CB2-6-M29-R1 Spike		CB2-8-M29-R1 Spike
				8	Reagent Blank

Analyses Requested	Samples 1-8	Hg
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Runs / FB	Fill / Ace (FH)		HNO ₃ (FH)		5% HNO ₃ /10% H ₂ O ₂ (BH)		HNO ₃ (A)		KMnO ₄ (B)		HCl (C)		
	pH <2.0	Y/N	pH <2.0	Y/N	pH <2.0	Y/N	pH <2.0	Y/N	pH <2.0	Y/N	pH <2.0	Y/N	
Lab ID	Fill ID	BV ml	BV ml	FV ml	BV ml	Used	FV ml	BV ml	FV ml	BV ml	FV ml	BV ml	FV ml
1		95	100	300				98	200	380	550	220	400
2.D		100	330					100		205		45	
3.S		95	320					108		305		225	
4.D.S		100	300					104		400		215	
5.D.S			315					104		↓		220	
6.D.S		↓	310					108		395		175	
7.D.S		95	b	320				110	↓	400	b	225	b

M-29 Reagent Blank

Lab ID	Fraction	BV, ml	FV, ml	Comments
8	C 7	FH	Acetone Blank	
	C 8A	FH	0.1N HNO ₃	300 100 Collected down 100ml
	C 8A	A	0.1N HNO ₃	300 —
	C 8B	B	DI H ₂ O	102 49 33mL combined w/ C10
	C 9	BH	5% HNO ₃ /10% H ₂ O ₂	200 60
	C 10	B	4% KMnO ₄ /10% H ₂ SO ₄	100 133
	C 11	C	8N HCl DI H ₂ O	220 400
	C 12	FH	Filter	— 100

Lab Communications

4FB + Spiked w/ 1000 ppm Std Hg (021421-H) - 0.1ml

Fractions Received: Runs: C1, C3, C4, C5A, C5B, C5C—RB; C12, C8A, C8B, C9, C10, C11---05.18.21 LLB

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5/18/2021 4:12:54 PM

SS Form By KMH
Labeled By/Date 5/18/21

FH Prep By/Date RHM 5/18/21 A Prep By/Date CHM 5/18/21
BH Prep By/Date B Prep By/Date KMH 5/18/21
BH/FH Prep By/Date C Prep By/Date KMH 5/18/21
PM Prep By/Date ID Verification By / Date KMH 5/18/21

Hg BH prep CHM 5/18/21

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Method 29 Hot Plate Worksheet

Lab ID # e 36718
Client: AIR

Date Digested: 5/26/21 Initials: RMH Worksheet Prepared by: RMH

Sample Lab ID	# of filters digested	Spike Vol. Added	Prep Volume (mL)	Comments
LRB	NA		150	
LRB Spike	NA	0.1		
36718-1	1			
-2				
-3				
-4				
-5				
-6				
-7				
-8				

Using appropriate 25ppm standard mix A, B, C, D, E, H & 100ppm standard mix F spike solutions at the rate of 0.1mL per 100mL for M29 samples.

Spike standard used: A lot # 021421-A	B lot # 021421-B	C lot # 021421-C
D lot # 021421-D	F lot # 021421-F	E lot # 021421-E
		(H lot # 021421-H)

Notes:

Nitric Acid Lot # <u>W0233</u>	mLs Used: <u>0</u>
Hydrofluoric Acid Lot # <u>SPI011</u>	mLs Used: <u>2</u>

Element One, Inc. F240 R1 Hot Plate Sheet M29

MERCURY BATCH DIGESTION - RUN WORKSHEET

Date Prepared/Digested: 5/26/21 Prep By: RMH SIF File #: 052621-1
 Block #1 Temperature: 95.49 Start Time: 9:30 Machine ID: FMS1
 Block #2 Temperature: BS.7 Stop Time: 11:00 Batch Analyst: RMH
 Block #3 Temperature: Typed By: RMH Verified By: CAM

A/S	Curve & QC's	0.4ug/ml working std		BV, ml	FV, ml	Standard Lot Numbers
1	Lab BLK (3/ batch)	0		40	40	Standard #1 (for working std) Lot #: <u>BCCB0017</u>
2	0.004 ug	0.01ml		40	40	Working Standard
3	0.04 ug	0.10ml		40	40	Lot #: <u>Hg4-107-A6</u> by: RMH
4	0.08 ug	0.20ml		40	40	Standard #2 (QC #2):
5	0.16 ug	0.40ml		40	40	Lot #: <u>Hg4-107-A6</u>
6	0.20ug	0.50ml		40	40	Standard #3 (QC #3):
7	QC #2= 0.08ug	0.2ml #2 std		40	40	Lot #: <u>Hg4-107-B7</u> <u>3ml</u>
8	QC #3= 0.08ug	0.2ml #3 std		40	40	Curve prepared by: RMH

Initial Review By: RMH

Date: 5/26/21

Time: 2:45

Final QC Review By: VCH

Date: 5/27/21

Time: 9:00

Comments: Location 40: 36707-1FH should be 11FH dup

A/S	LAB #	Method	Wt (g)/ FV (mL)	Prep Aliquot Used, mL	Aliquot or Calc Mass	FV, mL or "1" for conc.	Comments
9	36777-30 QC	3470-A			0.1	5	TV-395
10	LIL				1	1	TV=0.008
11	36737-3				10	1	
12	-3+				↓	1	
13	-3				5	1	
14	-3+	↓			↓	↓	
15	36704-18C	M29			4	400	
16	36708-1BH				1	140	
17	-1BH				1	540	
18	-1BH+				1	↓	
19	-1A	↓			1	200	

NOTES: Lab blanks and spikes must be prepared with each batch digestion

"+" Denotes spike for Hg. Use calibration working 0.4ug/ml standard at the rate of 0.20ml per 40ml sample, unless otherwise noted.

Digestion chemicals to be added in order at the following rate per 40ml volumes.

H_2SO_4 @ 2.0ml..... HNO_3 @ 1.0ml..... $KMnO_4$ @ 6.0ml..... Persulfate @ 3.2ml

H_2SO_4 Lot # <u>U0099</u>	HNO_3 Lot # <u>U0133</u>	HCl Lot #: <u>157095</u>
Persulfate Lot # <u>Hg4-97-5</u>	$KMnO_4$ Lot # <u>Hg4-107-8</u>	Hydrox Lott#: <u>Hg4-106-5</u>
Clear samples after digestion with 2.4 ml of Hydroxylamine solution.		

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MERCURY BATCH DIGESTION - RUN WORKSHEET

SIF File #: 0522021-1

A/S	LAB #	Method	Wt (g)/ FV (mL)	Prep Aliquot Used, mL.	Aliquot or Calc Mass	FV, mL or "1" for conc.	Comments
20	30708-0A+	M29			4	200	
21	-2C					400	
22	-2CD						
23	-3C						
24	-3C+						
25	-4C						
26	-4C						
27	-4C+						
28	30707-17					10.5 100	
29	-17D	DMIT			1		
30	-17+	SRM111			2		
31	30707-708A1LB				10.4		
32	-1RB+				1.0		
33	30707-4FH				4		
34	-5FH						
35	-5FD						
36	-6FH						
37	-6FH+						
38	-10FH						
39	-11FH						
40	-11FH D						
41	-12FH						
42	-12FH+						
43	3070B-1FH						
44	-2FH						
45	-2FHD						
46	-3FH						
47	-3FH+						
48	-4FH						
49	-5FH						
50	-5FHD						
51	-6FH						
52	-6FH+						
53	-7FH						
54	30730-1B	b				500	

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MERCURY BATCH DIGESTION - RUN WORKSHEET

SIF File #: 0574021-1

A/S	LAB #	Method	Wt (g)/ FV (mL)	Prep Aliquot Used, mL	Aliquot or Calc Mass	FV, mL or "1" for conc.	Comments
55	36718-2B	M29		4	500		
56	-2B D						
57	-3B						
58	-3B +						
59	-4B						
60	-1C					400	
61	-2C						
62	-2CD						
63	-3C						
64	-3C +						
65	36718-1C						
66	-2C						
67	-2CD						
68	-3C						
69	-3C +						
70	-4C						
71	-4CD						
72	-4C +						
73	-5C						
74	-5CD						
75	-5C +						
76	-1C						
77	-1CD						
78	-1C +						
79	-7C						
80	-7CD						
81	-7C +						
82	-8C						
83	36718-1BH			2	500	2x dilution	
84	-1BH			↓	↓	↓ spike 0.04	
85							
86							
87							
88							
89							

MERCURY BATCH DIGESTION - RUN WORKSHEET

Date Prepared/Digested: 5/27/21 Prep By: RMA SIF File #: 052721-1
 Block #1 Temperature: 94.26 Start Time: 5:45 Machine ID: FIMS1
 Block #2 Temperature: 86.4 Stop Time: 8:10 Batch Analyst: RMA
 Block #3 Temperature: Typed By: RMA Verified By: CWR

A/S	Curve & QC's	0.4ug/ml working std		BV, ml	FV, ml	Standard Lot Numbers
1	Lab BLK (3/ batch)	0		40	40	Standard #1 (for working std) Lot #: <u>Hg4.107.5</u> by: <u>RMA</u>
2	0.004 ug	0.01ml		40	40	Working Standard
3	0.04 ug	0.10ml		40	40	Lot #: <u>Hg4.107.5</u> by: <u>RMA</u>
4	0.08 ug	0.20ml		40	40	Standard #2 (QC #2):
5	0.16 ug	0.40ml		40	40	Lot #: <u>Hg4.107.8</u>
6	0.20ug	0.50ml		40	40	Standard #3 (QC #3):
7	QC #2= 0.08ug	0.2ml #2 std		40	40	Lot #: <u>Hg4.107.8</u> by: <u>RMA</u>
8	QC #3= 0.08ug	0.2ml #3 std		40	40	Curve prepared by: <u>RMA</u>

Initial Review By: RMA

Date: 5/27/21

Time: 2:50

Final QC Review By: RMA

Date: 5/27/21

Time: 15:10

Comments: missed 16

A/S	LAB #	Method	Wt (g)/ FV (mL)	Prep Aliquot Used, mL	Aliquot or Calc Mass	FV, mL or *1" for conc.	Comments
9	30277-20QC	7420-A			0.1	5	TV=3.95
10	L1L	↓			1	1	TV=0.008
11	30278-0BA	M29			↓	540	
12	-LBH +				↓	↓	
13	30277-17				0.5	100	
14	-17D				↓	↓	
15	-17+				↓	↓	
16	-13B				4	500	
17	-14B				↓	↓	
18	-13A				↓	200	
19	-14A	↓			↓	↓	

NOTES: Lab blanks and spikes must be prepared with each batch digestion

"+" Denotes spike for Hg. Use calibration working 0.4ug/ml standard at the rate of 0.20ml per 40ml sample, unless otherwise noted.

Digestion chemicals to be added in order at the following rate per 40ml volumes.

H_2SO_4 @ 2.0ml..... HNO_3 @ 1.0ml..... $KMnO_4$ @ 6.0ml..... Persulfate @ 3.2ml

H_2SO_4 Lot # 10009 HNO_3 Lot # 100155 HCl Lot #: 1527095

Persulfate Lot # Hg4.97.5 $KMnO_4$ Lot # Hg4.108.8 Hydrox Lott#: Hg4.108.5

Clear samples after digestion with 2.4 ml of Hydroxylamine solution.

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MERCURY BATCH DIGESTION - RUN WORKSHEET

SIF File #: 052721-1

A/S	LAB #	Method	Wt (g)/ FV (mL)	Prep Aliquot Used, mL	Aliquot or Calc Mass	FV, mL or "1" for conc.	Comments
20	30707-BBH	M29			4	3600	
21	-4BH				↓	190	
22	30718-720A1PB				↓	100	
23	-LRB+				1.0		
24	30718-1F+1				4		
25	-2FH				↓		
26	-2FH D				↓		
27	-3FH				↓		
28	-3FH +				↓		
29	-4FH				↓		
30	^{Em} sum 84FH D				↓		
31	-4FH +				↓		
32	-5FH				↓		
33	-5FH D				↓		
34	-5FH +				↓		
35	-6FH				↓		
36	-6FH D				↓		
37	-6FH +				↓		
38	-7FH				↓		
39	-7FH D				↓		
40	-7FH +				↓		
41	-8FH				↓		
42	30730-1FH				↓		
43	-2FH				↓		
44	-2FH D				↓		
45	-3FH				↓		
46	-3FH +				↓		
47	-4FH				↓	↓	
48	30741-3A1.BK 7470A				20	1	
49	-BK+				↓	↓	
50	30741-3				↓	↓	
51	30715-746P12BK				↓	↓	
52	-BK+				↓	↓	
53	30725-1				↓	↓	
54	-2				↓	↓	

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MERCURY BATCH DIGESTION - RUN WORKSHEET

SIF File #: 052721-1

A/S	LAB #	Method	Wt (g)/ FV (mL)	Prep Aliquot Used, mL	Aliquot or Calc Mass	FV, mL or "1" for conc.	Comments
55	3U753	7470A			20	1	
56	-4				1	1	
57	3U741				1	1	
58	-2 ^{30ml} 30ml				1	1	
59	-2D+				1	1	
60	3U745				1	1	
61	-745D	↓			↓	↓	
62	3U0821RB	747-FB			4	1	
63	-LRB+	↓			b	↓	
64	-1	↓	0.50(0.150)	4	0.0405	↓	
65							
66							
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MERCURY BATCH DIGESTION - RUN WORKSHEET

Date Prepared/Digested: 5/26/21 Prep By: RMT SIF File #: 052721-2
 Block #1 Temperature: 94.40 Start Time: 5:45 Machine ID: FIMS 2
 Block #2 Temperature: 94.4 Stop Time: 8:00 Batch Analyst: KMH
 Block #3 Temperature: - Typed By: RMT Verified By: Cam

A/S	Curve & QC's	0.4ug/ml working std		BV, ml	FV, ml	Standard Lot Numbers
1	Lab BLK (3/ batch)	0		40	40	Standard #1 (for working std) Lot #: <u>BCCBPF27</u>
2	0.004 ug	0.01ml		40	40	Working Standard
3	0.04 ug	0.10ml		40	40	Lot #: <u>Hg4107.5</u> by: <u>KMH</u>
4	0.08 ug	0.20ml		40	40	Standard #2 (QC #2):
5	0.16 ug	0.40ml		40	40	Lot #: <u>Hg4107.6</u>
6	0.20ug	0.50ml		40	40	Standard #3 (QC #3):
7	QC #2= 0.08ug	0.2ml #2 std		40	40	Lot #: <u>Hg4107.7</u>
8	QC #3= 0.08ug	0.2ml #3 std		40	40	Curve prepared by: <u>KMH</u>

Initial Review By: RMT

Date: 5/27/21

Time: 2:45

Final QC Review By: RMT

Date: 5/27/21

Time: 1640

Comments:

A/S	LAB #	Method	Wt (g)/ FV (mL)	Prep Aliquot Used, mL	Aliquot or Calc Mass	FV, mL or "1" for conc.	Comments
9	5U71B-2DQC	74P0-A			0.1	5	TV=3.95
10	L1L	b			1	1	TV=0.008
11	5U71B-1B	M29			4	500	
12	-2B						
13	-2BD						
14	-2B						
15	-3B+						
16	-4B						
17	-4BD						
18	-4B+						
19	-5B						

NOTES: Lab blanks and spikes must be prepared with each batch digestion

"+" Denotes spike for Hg. Use calibration working 0.4ug/ml standard at the rate of 0.20ml per 40ml sample, unless otherwise noted.

Digestion chemicals to be added in order at the following rate per 40ml volumes.

H_2SO_4 @ 2.0ml..... HNO_3 @ 1.0ml..... $KMnO_4$ @ 6.0ml..... Persulfate @ 3.2ml

H_2SO_4 Lot # <u>00009</u>	HNO_3 Lot # <u>1e0155</u>	HCl Lot #: <u>257695</u>
Persulfate Lot # <u>Hg4107.5</u>	$KMnO_4$ Lot # <u>Hg4108.8</u>	Hydrox Lot#: <u>Hg4108.5</u>

Clear samples after digestion with 2.4 ml of Hydroxylamine solution.

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MERCURY BATCH DIGESTION - RUN WORKSHEET

SIF File #: 0527-21-2

A/S	LAB #	Method	Wt (g)/ FV (mL)	Prep Aliquot Used, mL	Aliquot or Calc Mass	FV, mL or "1" for conc.	Comments
20	3071B-5BD	M29			4	500	
21	-5B+						
22	-1B						
23	-1BD						
24	-10B+						
25	-7B						
26	-7BD						
27	-7B+						
28	-8B					↓	
29	-1BH					300	
30	-2BH					330	
31	-2BHD					↓	
32	-3BH					320	
33	-3BH+					↓	
34	-4BH					300	
35	-4BHD					↓	
36	-4BH+					315	
37	-5BH						
38	-5BD					↓	
39	-5BH+					320	
40	-1BH					310	
41	-1BHD					↓	
42	-1BH+					310	
43	-7BH					↓	
44	-7BHD					320	
45	-7BH+					↓	
46	-8BH					200	
47	-1A					200	
48	-2A						
49	-2AD						
50	-3A						
51	-3A+						
52	-4A						
53	-4AD						
54	-4A+				↓	↓	

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MERCURY BATCH DIGESTION - RUN WORKSHEET

SIF File #: 0527'17

A/S	LAB #	Method	Wt (g)/ FV (mL)	Prep Aliquot Used, mL	Aliquot or Calc Mass	FV, mL or "1" for conc.	Comments
55	36718-5A	M29			4	200	
56	-5AD						
57	-5AT						
58	-6A						
59	-6AD						
60	-6AT						
61	-7A						
62	-7AD						
63	-7AT						
64	-8A						
65	36718-8B	7471B			4	1	
66	-12Bt				↓		
67	-1		0.513150	4	0.0409		
68	-2		0.528150		0.0430		
69	-2D		0.513150		0.0449		
70	-3		0.531150		0.0425		
71	Blank gram-314		0.5097150		0.0408		
72	-5		0.5291150		0.0423		
73	-5D		0.5011150		0.0401		
74	-6		0.5023150		0.0402		
75	-7		0.5191150		0.0439		
76	-8		0.5735450		0.0460		
77	-9		0.5914150		0.0415		
78	-10		0.5152150	↓	0.0412	↓	
79							
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89							

PerkinElmer FIMS-100 CVAA Mercury Analyzer

Sample_ID	Date	Time	Mean_Sig	Mean_Rd	Mean_Rt	Units	Alq.	Vol.	Sig 1	Reading-1	Result-1	Sig 2	Reading-2	Result-2	Cor. Coeff.
36718-6A DUP	5/27/2021	1:56:00 PM	-8.37E-05	-0.0005737	-0.0286856	µg	4	200	-6.22E-05	-0.0005071	-0.0253569	-0.0001052	-0.0006403	-0.0320144	0.999787252
36718-6A SPK	5/27/2021	1:57:44 PM	0.02546599	0.0785766	3.92883003	µg	4	200	0.02565695	0.07916817	3.95840838	0.02527503	0.07798503	3.89925168	0.999787252
36718-7A	5/27/2021	1:59:39 PM	-0.0001283	-0.0007118	-0.0355917	µg	4	200	-0.0001269	-0.0007075	-0.0353749	-0.0001297	-0.0007162	-0.0358084	0.999787252
36718-7A DUP	5/27/2021	2:01:23 PM	-0.0001235	-0.000697	-0.0348487	µg	4	200	-0.0001408	-0.0007505	-0.0375239	-0.0001062	-0.0006435	-0.0321735	0.999787252
36718-7A SPK	5/27/2021	2:03:06 PM	0.02666648	0.08229559	4.11477948	µg	4	200	0.02693426	0.08312515	4.15625753	0.0263987	0.08146603	4.07330142	0.999787252
36718-8A	5/27/2021	2:05:00 PM	-2.85E-05	-0.0004027	-0.0201347	µg	4	200	3.79E-06	-0.0003026	-0.0151317	-6.08E-05	-0.0005028	-0.0251377	0.999787252
0.004ug = DL	5/27/2021	2:12:13 PM	0.00114641	0.00355147	0.00355147	µg			0.00115305	0.00357203	0.00357203	0.00113978	0.00353091	0.00353091	0.999787252
0.080ug = QC STD 2	5/27/2021	2:13:56 PM	0.02513613	0.0778691	0.0778691	µg			0.02532792	0.07846324	0.07846324	0.02494434	0.07727496	0.07727496	0.999787252
Reagent Blank	5/27/2021	2:15:48 PM	8.31E-05	0.00025728	0.00025728	µg			6.79E-05	0.00021027	0.00021027	9.82E-05	0.00030429	0.00030429	0.999787252

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APPENDIX F

CALIBRATION DATA



Environmental Supply Company, Inc.

Quality Source Sampling Systems & Accessories

15 POINT SECONDARY REFERENCE METER CALIBRATION

Date: 8/15/2019 DGM Model: T-110
 Customer: Advanced Industrial Resources DGM S/N: 27979
 Reference Prover: Cert.# A-610 Tape # 26727

Pb: 29.89 in Hg

Approx. Flow Rate (cfm) Q	Prover Volume (ft ³) V _w	DGM Volume (ft ³) V _{ds}	Temperature		Time (min) Φ	Flow Rate (cfm) Q	Meter Coefficient Y _{ds}	Average Meter Coefficient Y _{ds}
			Prover (°F) t _w	DGM (°F) t _{ds}				
0.40	2.000	2.020	76.2	76.2	5.148	0.382	0.990	
0.40	2.000	2.019	76.1	76.1	5.117	0.384	0.991	
0.40	2.000	2.009	76.2	76.2	5.122	0.384	0.996	0.992
0.60	2.000	2.018	76.5	76.5	3.320	0.592	0.991	
0.60	2.000	2.017	75.9	75.9	3.318	0.593	0.992	
0.60	2.000	2.017	75.9	75.9	3.308	0.595	0.992	0.991
0.80	2.000	2.017	75.9	75.9	2.438	0.807	0.992	
0.80	2.000	2.017	76.2	76.2	2.432	0.809	0.992	
0.80	2.000	2.023	75.9	75.9	2.428	0.810	0.989	0.991
1.00	2.000	2.022	76.3	76.3	1.943	1.012	0.989	
1.00	2.000	2.017	75.6	75.6	1.947	1.011	0.992	
1.00	2.000	2.016	76.2	76.2	1.942	1.013	0.992	0.991
1.20	2.000	2.007	75.5	75.5	1.622	1.214	0.997	
1.20	2.000	2.016	75.5	75.5	1.623	1.213	0.992	
1.20	2.000	2.017	75.5	75.5	1.623	1.213	0.992	0.993

AVERAGE Y_{ds} 0.992

$$Y_{ds} = \frac{V_w(t_{ds} + t_{std})}{V_{ds}(t_w + t_{std})} * \left(\frac{P_{bar}}{P_{bar} + P_m / 13.6} \right)$$

$$Q = 17.64 \frac{P_{bar}}{(t_w + t_{std})} \frac{V_w}{\Phi}$$

Dry gas meter Serial Number 27979 was calibrated in accordance with the Code of Federal Regulations, Title 40, Part 60, Appendix A, Method 5 Section 16.1.1



Signature



Environmental Supply Company, Inc.

Quality Source Sampling Systems & Accessories

15 POINT SECONDARY REFERENCE METER CALIBRATION

Date: 8/27/2019 DGM Model: T-110
 Customer: Advanced Industrial Resources DGM S/N: 356333
 Reference Prover: Cert.# A-610 Tape # 26727

Pb: 29.86 in Hg

Approx. Flow Rate (cfm) Q	Prover Volume (ft ³) V_w	DGM Volume (ft ³) V_{ds}	Temperature		Time (min) Φ	Flow Rate (cfm) Q	Meter Coefficient Y_{ds}	Average Meter Coefficient Y_{ds}
			Prover (°F) t_w	DGM (°F) t_{ds}				
0.40	2.000	1.998	77.9	75.8	5.092	0.385	0.997	
0.40	2.000	1.997	77.4	75.8	5.088	0.385	0.999	
0.40	2.000	1.998	77.4	75.7	5.097	0.385	0.998	0.998
0.60	2.000	2.004	75.8	75.8	3.290	0.598	0.998	
0.60	2.000	2.003	75.8	75.8	3.288	0.598	0.999	
0.60	2.000	2.003	75.8	75.8	3.285	0.599	0.999	0.998
0.80	2.000	2.006	75.8	75.8	2.453	0.801	0.997	
0.80	2.000	2.007	75.8	75.8	2.442	0.805	0.997	
0.80	2.000	2.001	75.5	75.5	2.440	0.806	1.000	0.998
1.00	2.000	2.001	75.9	75.9	1.918	1.025	1.000	
1.00	2.000	2.006	75.9	75.9	1.925	1.021	0.997	
1.00	2.000	2.010	75.9	75.9	1.928	1.019	0.995	0.997
1.20	2.000	2.007	75.9	75.9	1.595	1.232	0.997	
1.20	2.000	2.006	75.9	75.9	1.597	1.231	0.997	
1.20	2.000	2.006	75.9	75.9	1.588	1.238	0.997	0.997

AVERAGE Y_{ds} **0.998**

$$Y_{ds} = \frac{V_w(t_{ds} + t_{std})}{V_{ds}(t_w + t_{std})} * \left(\frac{P_{bar}}{P_{bar} + P_m / 13.6} \right)$$

$$Q = 17.64 \frac{P_{bar}}{(t_w + t_{std})} \frac{V_w}{\Phi}$$

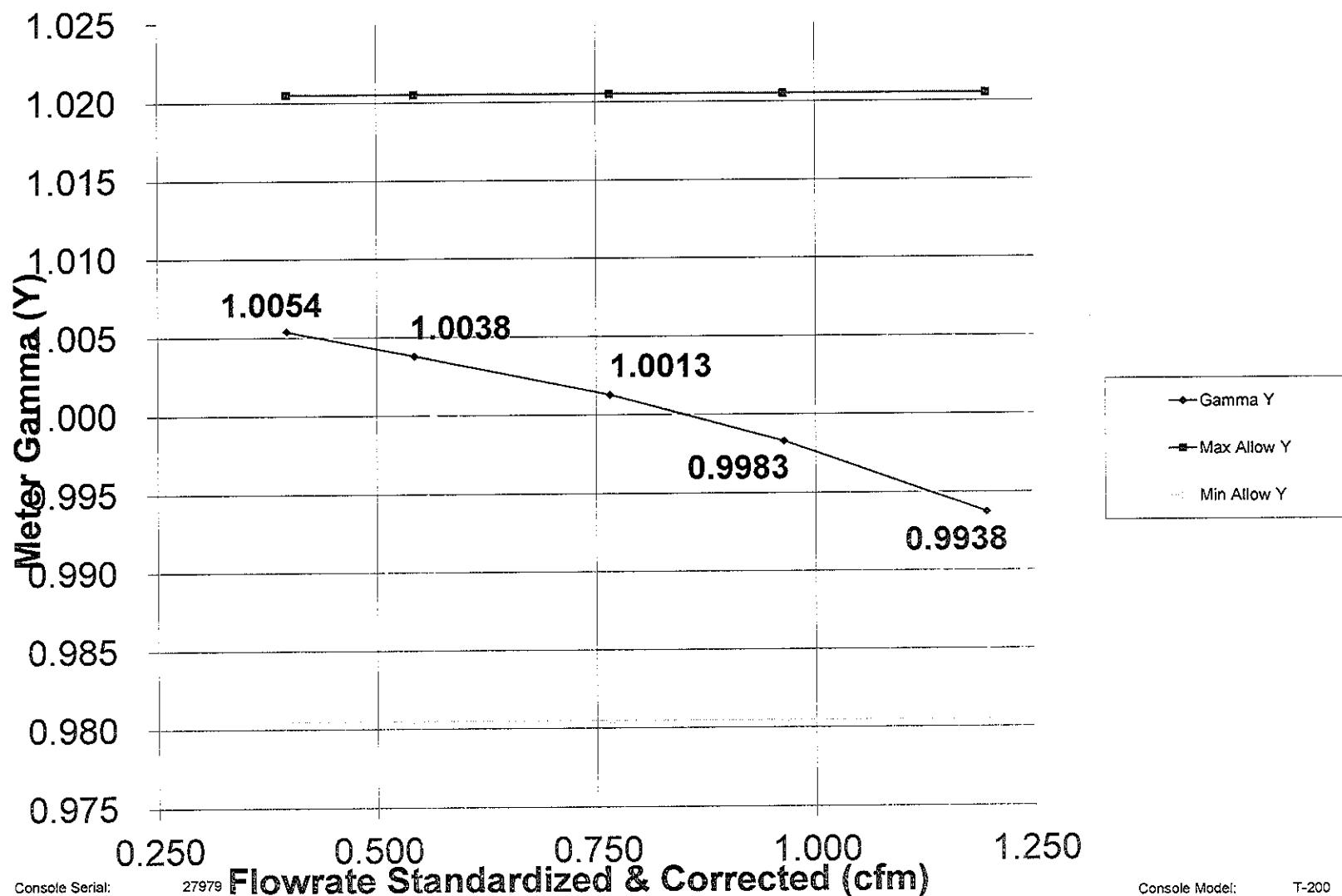
Dry gas meter Serial Number 356333 was calibrated in accordance with the Code of Federal Regulations, Title 40, Part 60, Appendix A, Method 5 Section 16.1.1

Signature

Calibration Date: 10-10-2017

Calibration Technician: EW

Meter Gamma vs Flowrate



Console Serial:

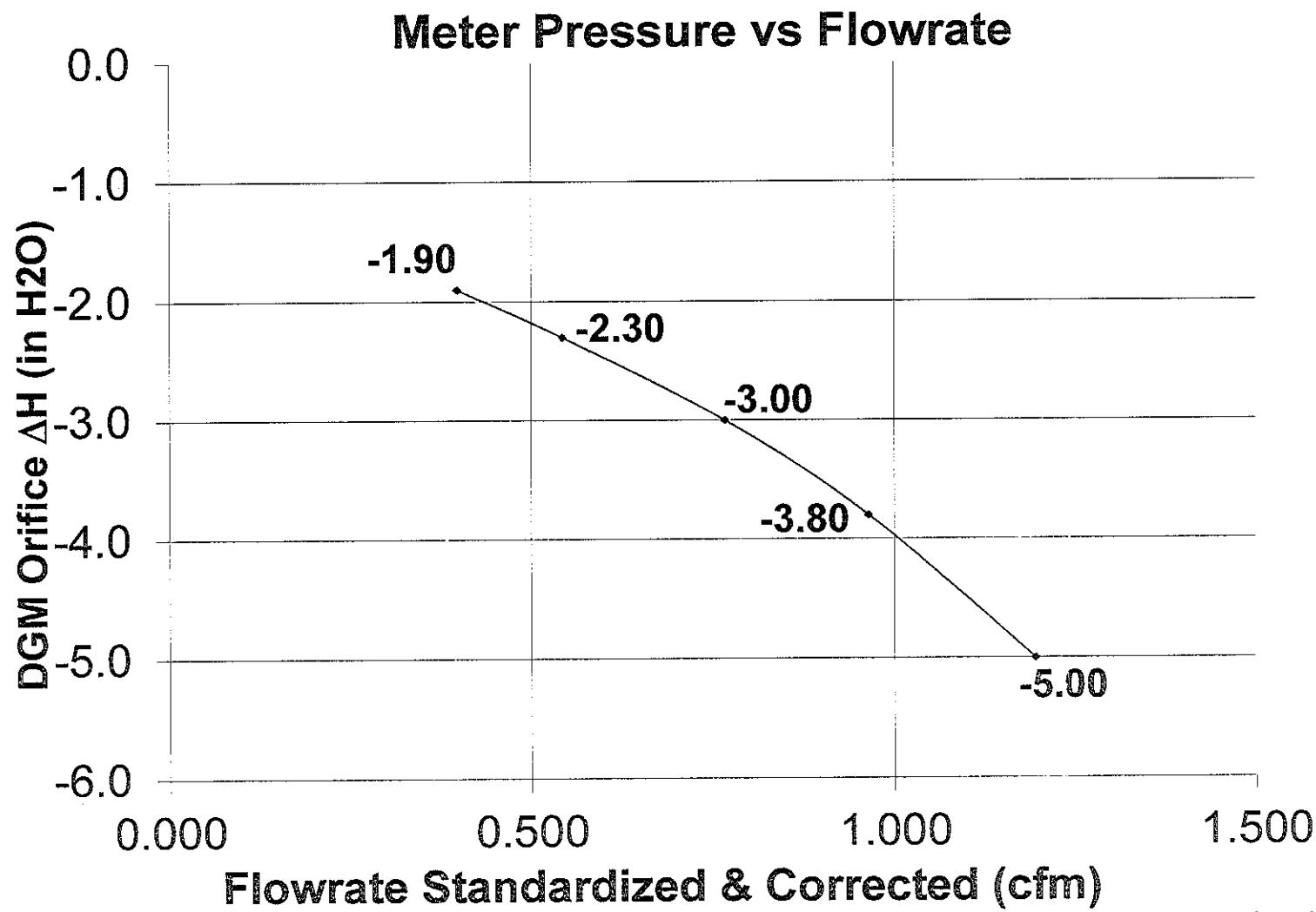
27979

Console Model:

T-200

Calibration Date: 10-10-2017

Calibration Technician: EW



Console Serial: 27979

Console Model: T-200

Advanced Industrial Resources, Inc.

Dry Gas Meter Calibration Data

Dry Gas Meter	
Console ID:	C-013
Serial Number:	

Reference Meter	
Meter ID:	M5 RFM #1
Calibration Factor, Y_w :	0.998

Date: 03/23/21
 Barometric Pressure, P_b (in. Hg): 29.65

Performed By: RB
 Reviewed By: _____

Data								
Vacuum (in. Hg)	ΔH (in. H ₂ O)	Reference Meter Volume V_w (ft ³)	Dry Gas Meter Volume V_m (ft ³)	Temperatures (°F)			Time Elapsed θ (min.)	
				Reference Meter t_w	Dry Gas Meter t_i	Dry Gas Meter t_f		
5.0	0.50	8.521	9.372	68	68.0	68.0	68.0	22.00
5.0	1.00	15.123	16.724	68	71.0	71.0	71.0	27.00
5.0	2.00	8.151	9.082	70	74.0	74.0	74.0	10.00
5.0	3.00	13.118	14.689	70	78.0	78.0	78.0	13.00
5.0	4.00	24.477	27.489	71	81.0	81.0	81.0	21.00

Calculations						
ΔH (inches H ₂ O)	Y_m	Variation (dimensionless)		$\Delta H_{@}$ (inches H ₂ O)	Variation (dimensionless)	
0.50	0.906	0.005	PASS	1.889	0.152	PASS
1.00	0.905	0.005	PASS	1.796	0.060	PASS
2.00	0.898	-0.003	PASS	1.700	-0.037	PASS
3.00	0.898	-0.003	PASS	1.651	-0.085	PASS
4.00	0.896	-0.004	PASS	1.647	-0.090	PASS
Averages:	0.901	PASS		1.737	PASS	

Where:

Y_m is the ratio of the reading of the reference meter to that of the dry gas meter (DGM); variance limit: ± 0.02 .

$$Y_m = \frac{Y_w V_w P_b (t_m + 460)}{V_m (P_b + \Delta H/13.6) (t_w + 460)}$$

$\Delta H_{@}$ is the orifice pressure differential (inches H₂O) that corresponds to 0.75 cfm of air at 68 °F and 29.92 inches of mercury; variance limit: ± 0.20 .

$$\Delta H_{@} = \frac{0.0317 \Delta H ((t_w + 460) \theta)^2}{P_b (t_m + 460) (Y_w V_w)^2}$$

Advanced Industrial Resources, Inc.

Dry Gas Meter Calibration Data

Dry Gas Meter	
Console ID:	C-013
Serial Number:	

Reference Meter	
Meter ID:	M5 RFM 1
Calibration Factor, Y_w :	0.9980

Date: 05/17/21 Accepted Y_m : 0.901
 Barometric Pressure, P_b (in. Hg): 29.16 Performed By: KF

Data								
Vacuum (in. Hg)	ΔH (in. H ₂ O)	Net Reference Meter Volume V_w (ft ³)	Net Dry Gas Meter Volume V_m (ft ³)	Temperatures (°F)			Time Elapsed θ (min.)	
				Reference Meter t_w	Dry Gas Meter			
					init. t_i	final t_f	avg. t_m	
5.0	3.00	4.646	5.121	75	72	74	73.0	4.50
5.0	3.00	5.724	6.308	75	74	75	74.5	5.50
5.0	3.00	4.707	5.197	75	76	77	76.5	4.50

Calculations						
ΔH (inches H ₂ O)	Y_m	Variation (dimensionless)		$\Delta H_{@}$ (inches H ₂ O)	Variation (dimensionless)	
3.00	0.895	-0.0024	PASS	1.650	0.028	PASS
3.00	0.898	0.0003	PASS	1.619	-0.003	PASS
3.00	0.900	0.0020	PASS	1.597	-0.025	PASS
Averages:	0.898	PASS		1.622	PASS	

**Note: Avg Y_m cannot be (< or >) 5% of the Accepted Y_M	Low Tolerance	High Tolerance	% diff	Pass or Fail?
	0.856	0.946	0%	
				PASS

Where:

Y_m is the ratio of the reading of the reference meter to that of the dry gas meter (DGM); variance limit: ±0.02.

$$Y_m = \frac{Y_w V_w P_b (t_m + 460)}{V_m (P_b + \Delta H/13.6) (t_w + 460)}$$

$\Delta H_{@}$ is the orifice pressure differential (inches H₂O) that corresponds to 0.75 cfm of air at 68 °F and 29.92 inches of mercury; variance limit: ±0.20.

$$\Delta H_{@} = \frac{0.0317 \Delta H ((t_w + 460) \theta)^2}{P_b (t_m + 460) (Y_w V_w)^2}$$

Advanced Industrial Resources, Inc.

Dry Gas Meter Calibration Data

Dry Gas Meter	
Console ID:	C-015
Serial Number:	

Reference Meter	
Meter ID:	M5 RFM 1
Calibration Factor, Y_w :	0.998

Date: 04/28/21 Performed By: KF
 Barometric Pressure, P_b (in. Hg): 29.16 Reviewed By:

Data								
Vacuum (in. Hg)	ΔH (in. H_2O)	Reference Meter Volume V_w (ft^3)	Dry Gas Meter Volume V_m (ft^3)	Temperatures ($^{\circ}F$)			Time Elapsed θ (min.)	
				Reference Meter t_w	Dry Gas Meter			
					init.	final	avg. t_m	
5.0	0.50	5.082	5.090	75	81.0	83.0	82.0	13.00
5.0	1.00	4.935	5.017	75	83.0	85.0	84.0	8.75
5.0	2.00	4.850	4.969	75	84.0	86.0	85.0	6.00
5.0	3.00	4.807	4.930	75	86.0	87.0	86.5	4.75
5.0	4.00	4.931	5.064	75	86.0	88.0	87.0	4.25

Calculations						
ΔH (inches H_2O)	Y_m	Variation (dimensionless)		$\Delta H_{@}$ (inches H_2O)	Variation (dimensionless)	
0.50	1.008	0.016	PASS	1.886	0.122	PASS
1.00	0.996	0.003	PASS	1.805	0.042	PASS
2.00	0.987	-0.005	PASS	1.755	-0.009	PASS
3.00	0.987	-0.006	PASS	1.675	-0.089	PASS
4.00	0.984	-0.009	PASS	1.697	-0.066	PASS
Averages:	0.992	PASS		1.763	PASS	

Where:

Y_m is the ratio of the reading of the reference meter to that of the dry gas meter (DGM); variance limit: ± 0.02 .

$$Y_m = \frac{Y_w V_w P_b (t_m + 460)}{V_m (P_b + \Delta H/13.6) (t_w + 460)}$$

$\Delta H_{@}$ is the orifice pressure differential (inches H_2O) that corresponds to 0.75 cfm of air at 68 °F and 29.92 inches of mercury; variance limit: ± 0.20 .

$$\Delta H_{@} = \frac{0.0317 \Delta H ((t_w + 460) \theta)^2}{P_b (t_m + 460) (Y_w V_w)^2}$$

Advanced Industrial Resources, Inc.

Dry Gas Meter Calibration Data

Dry Gas Meter	
Console ID:	C-15
Serial Number:	

Reference Meter	
Meter ID:	M5 RFM 1
Calibration Factor, Y_w :	0.9880

Date: 05/17/21 Accepted Y_m : 0.992
 Barometric Pressure, P_b (in. Hg): 29.11 Performed By: KF

Data								
Vacuum (in. Hg)	ΔH (in. H ₂ O)	Net Reference Meter Volume V_w (ft ³)	Net Dry Gas Meter Volume V_m (ft ³)	Temperatures (°F)			Time Elapsed θ (min.)	
				Reference Meter t_w	Dry Gas Meter			
					init. t_i	final t_f	avg. t_m	
5.0	3.00	5.044	5.150	75	62	65	63.5	5.00
5.0	3.00	4.814	4.932	75	65	67	66.0	4.75
5.0	3.00	5.054	5.189	75	67	70	68.5	5.00

Calculations						
ΔH (inches H ₂ O)	Y_m	Variation (dimensionless)		$\Delta H_{@}$ (inches H ₂ O)	Variation (dimensionless)	
3.00	0.940	-0.0017	PASS	1.798	0.016	PASS
3.00	0.941	-0.0004	PASS	1.773	-0.009	PASS
3.00	0.943	0.0021	PASS	1.774	-0.008	PASS
Averages:	0.941	PASS		1.782	PASS	

**Note: Avg Y_m cannot be (< or >) 5% of the Accepted Y_M	Low Tolerance	High Tolerance	% diff	Pass or Fail?
	0.942	1.042	5%	
				PASS

Where:

Y_m is the ratio of the reading of the reference meter to that of the dry gas meter (DGM); variance limit: ±0.02.

$$Y_m = \frac{Y_w V_w P_b (t_m + 460)}{V_m (P_b + \Delta H/13.6) (t_w + 460)}$$

$\Delta H_{@}$ is the orifice pressure differential (inches H₂O) that corresponds to 0.75 cfm of air at 68 °F and 29.92 inches of mercury; variance limit: ±0.20.

$$\Delta H_{@} = \frac{0.0317 \Delta H ((t_w + 460) \theta)^2}{P_b (t_m + 460) (Y_w V_w)^2}$$

Advanced Industrial Resources, Inc.

Thermocouple Calibration Data

Thermometer ID: RT-01 ; RT-03 Date: 05/13/21
Bias: 0 Performed By: RB

Apparatus ID	Apparatus Description	Reference Temperature Reading		Indicated Temperature		Relative Variation
		°F	°R	°F	°R	
P3-02	Stack Temp.	32	492	33	493	0.2
P3-02	Stack Temp.	210	670	211	671	0.1
B-13	Filter Temp.	32	492	32	492	0.0
B-13	Filter Temp.	210	670	210	670	0.0
B-13	Exit Imp. Temp.	32	492	33	493	0.2
B-13	Exit Imp. Temp.	210	670	211	671	0.1
C-013	Meter In Temp.	32	492	32	492	0.0
C-013	Meter In Temp.	210	670	212	672	0.3
C-013	Meter Out Temp.	32	492	33	493	0.2
C-013	Meter Out Temp.	210	670	211	671	0.1
B-13	Filter Exit Temp.	32	492	32	492	0.0
B-13	Filter Exit Temp.	210	670	210	670	0.0
P3-02	Probe Temp.	32	492	32	492	0.0
P3-02	Probe Temp.	210	670	210	670	0.0

Thermocouple Calibration Procedure

A. References

1. Mercury-in-glass reference thermometer, calibrated against thermometric fixed points.
2. Thermometric fixed points, including ice bath and boiling water (corrected for barometric pressure)

B. Measurement

1. Compare field temperature sensors against the reference thermometer. Agreement must be within $\pm 1.5\%$ of the absolute reference temperature.

Advanced Industrial Resources, Inc.

Thermocouple Calibration Data

Thermometer ID: RT-01 ; RT-03 **Date:** 05/13/21
Bias: 0 **Performed By:** RB

Apparatus ID	Apparatus Description	Reference Temperature Reading		Indicated Temperature		Relative Variation
		°F	°R	°F	°R	
P8-02	Stack Temp.	32	492	32	492	0.0
P8-02	Stack Temp.	210	670	212	672	0.3
B-12	Filter Temp.	32	492	33	493	0.2
B-12	Filter Temp.	210	670	210	670	0.0
B-12	Exit Imp. Temp.	32	492	33	493	0.2
B-12	Exit Imp. Temp.	210	670	212	672	0.3
C-015	Meter In Temp.	32	492	32	492	0.0
C-015	Meter In Temp.	210	670	210	670	0.0
C-015	Meter Out Temp.	32	492	33	493	0.2
C-015	Meter Out Temp.	210	670	211	671	0.1
B-12	Filter Exit Temp.	32	492	33	493	0.2
B-12	Filter Exit Temp.	210	670	212	672	0.3
P8-02	Probe Temp.	32	492	33	493	0.2
P8-02	Probe Temp.	210	670	211	671	0.1

Thermocouple Calibration Procedure

A. References

1. Mercury-in-glass reference thermometer, calibrated against thermometric fixed points.
2. Thermometric fixed points, including ice bath and boiling water (corrected for barometric pressure)

B. Measurement

1. Compare field temperature sensors against the reference thermometer. Agreement must be within $\pm 1.5\%$ of the absolute reference temperature.

Advanced Industrial Resources, Inc.

Type-S Pitot Tube Assembly Inspection Data Sheet

Date: 5/14/2021

Pitot Tube Assembly: P8-02
Performed by: LS

Caliper ID: CL-04

Pitot tube assembly level? X yes _____ no

Pitot tube openings damaged? _____ yes (explain below) X no

$\alpha_1 = \underline{1}^{\circ} (<10^{\circ})$ $\beta_1 = \underline{2}^{\circ} (<5^{\circ})$

$\alpha_2 = \underline{4}^{\circ} (<10^{\circ})$ $\beta_2 = \underline{0}^{\circ} (<5^{\circ})$

$\gamma = \underline{1}^{\circ}$ $\theta = \underline{1}^{\circ}$ $A = \underline{0.92}$ in.

$z = A \sin \gamma = \underline{0.0160}$ in. <1/8 in. (0.125 in.)

$w = A \sin \theta = \underline{0.0160}$ in. <1/32 in. (0.03125 in.)

$P_A = \underline{0.450}$ in. $P_B = \underline{0.450}$ in.

$D_t = \underline{0.3}$ in. $P / D_t = \frac{\underline{1.5}}{P_a = P_b = P}$ (1.05 </= and </= 1.50)

$X = \underline{1.20}$ (>0.75 in.) (Dist. between pitot and nozzle)

$Y = \underline{3.19}$ (>3.0 in.) (Dist. from nozzle union to pitot tube openings)

$Z = \underline{1.70}$ (>0.75 in.) (Dist. between pitot and stack thermocouple)

Does the pitot tube assembly meet the Method 2 requirements? X yes
_____ no (explain below)

If the Method 2 requirements are met then a coefficient of **0.84** is assigned
to the pitot tube assembly being inspected.

Advanced Industrial Resources, Inc.

Type-S Pitot Tube Assembly Inspection Data Sheet

Date: 5/14/2021

Pitot Tube Assembly: P3-02
Performed by: LS

Caliper ID: CL-04

Pitot tube assembly level? x yes _____ no

Pitot tube openings damaged? _____ yes (explain below) x no

$$\alpha_1 = \underline{3}^\circ (< 10^\circ) \quad \beta_1 = \underline{2}^\circ (< 5^\circ)$$

$$\alpha_2 = \underline{3}^\circ (< 10^\circ) \quad \beta_2 = \underline{2}^\circ (< 5^\circ)$$

$$\gamma = \underline{1}^\circ \quad \theta = \underline{1}^\circ \quad A = \underline{0.95} \text{ in.}$$

$$z = A \sin \gamma = \underline{0.0166} \text{ in.} \quad < 1/8 \text{ in. (0.125 in.)}$$

$$w = A \sin \theta = \underline{0.0166} \text{ in.} \quad < 1/32 \text{ in. (0.03125 in.)}$$

$$P_A = \underline{0.475} \text{ in.} \quad P_B = \underline{0.475} \text{ in.}$$

$$D_t = \underline{0.38} \text{ in.} \quad P / D_t = \frac{\underline{1.25}}{P_a = P_b = P} (1.05 \leq \text{and} \leq 1.50)$$

$$X = \underline{1.97} \text{ (> 0.75 in.)} \quad (\text{Dist. between pitot and nozzle})$$

$$Y = \underline{3.62} \text{ (> 3.0 in.)} \quad (\text{Dist. from nozzle union to pitot tube openings})$$

$$Z = \underline{1.69} \text{ (> 0.75 in.)} \quad (\text{Dist. between pitot and stack thermocouple})$$

Does the pitot tube assembly meet the Method 2 requirements? x yes
_____ no (explain below)

If the Method 2 requirements are met then a coefficient of **0.84** is assigned
to the pitot tube assembly being inspected.

Advanced Industrial Resources, Inc.

Nozzle Calibration Data

Client: Mag 7 Metals

Date: 5/11/21

Location: Marston, MO

Performed By: LS

Caliper ID: CAL-06

Source	Nozzle ID	Nozzle Description	Measurements (inches)			Average (inches)
			1	2	3	
CB2-5, CB2-6, CB2-8	GNS-3	Glass	0.210	0.210	0.210	0.210
CB2-7	GN4-2	Glass	0.200	0.200	0.200	0.200
LS - CB2-8 CB3	GNS-6	Glass	0.385	0.385	0.385	0.385

Test Team Leader Review: _____

Data Entry Review: _____

Advanced Industrial Resources, Inc.

Analyzer Pretest Data Worksheet

Operator Name: Greg Essig Source ID: Carbon Bake
Facility Name, Location: Magnitude 7 Metals Date: 5/12/21

Analyte 1: Oxygen O2 EPA Method: 3A
Analyte 2: Carbon Dioxide CO2 EPA Method: 3A

Calibration Gas Serial Numbers & Concentrations

(Zero, Low, Mid and High)	Analyzer I.D.	Concentration (% or ppm)	Cylinder ID #	Expiration Date
Zero (N ₂ or Air)	NA	0.00	NA	NA
O2/ CO2 (Mid)	15	10.66/8.98	CC725007	5/18/2028
O2/ CO2 (High)	15	19.43/18.12	EB0065881	5/18/2021

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E03NI80E15A0007	Reference Number:	122-401812673-1
Cylinder Number:	CC725007	Cylinder Volume:	150.4 CF
Laboratory:	124 - Durham (SAP) - NC	Cylinder Pressure:	2015 PSIG
PGVP Number:	B22020	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	May 18, 2020

Expiration Date: May 18, 2028

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

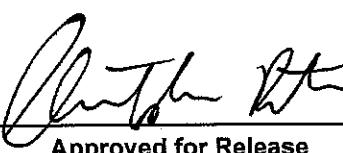
ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	9.000 %	8.980 %	G1	+/- 0.6% NIST Traceable	05/18/2020
OXYGEN	11.00 %	10.66 %	G1	+/- 0.7% NIST Traceable	05/18/2020
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	13060638	CC414571	13.359 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	May 14, 2025
NTRM	98051109	SG9168283BAL	9.507 % OXYGEN/NITROGEN	+/- 0.7%	Oct 06, 2021

ANALYTICAL EQUIPMENT					
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration			
Horiba VIA510 CO2 2L6YXWY0	Nondispersive Infrared (NDIR)	Apr 29, 2020			
Horiba MPA510 O2 41499150042	Paramagnetic	Apr 28, 2020			

Triad Data Available Upon Request




Approved for Release

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E03NI62E15A1071	Reference Number:	122-401812702-1
Cylinder Number:	EB0065881	Cylinder Volume:	157.9 CF
Laboratory:	124 - Durham (SAP) - NC	Cylinder Pressure:	2015 PSIG
PGVP Number:	B22020	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	May 18, 2020

Expiration Date: May 18, 2028

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

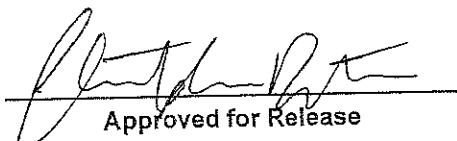
ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	18.00 %	18.12 %	G1	+/- 0.6% NIST Traceable	05/18/2020
OXYGEN	20.00 %	19.43 %	G1	+/- 0.5% NIST Traceable	05/18/2020
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12061508	CC354696	19.87 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	Jan 11, 2024
NTRM	08010202	1D003076	23.20 % OXYGEN/NITROGEN	+/- 0.4%	Jun 01, 2024

ANALYTICAL EQUIPMENT					
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration			
Horiba VIA510 CO2 2L6YXWY0	Nondispersive Infrared (NDIR)	Apr 29, 2020			
Horiba MPA510 O2 41499150042	Paramagnetic	Apr 28, 2020			

Triad Data Available Upon Request




 Approved for Release

APPENDIX G

PROCESS OPERATION DATA

Magnitude 7 Metals LLC

Field Notes - Operating Parameters

The operating parameters for Magnitude 7 Metals' scrubbers and baghouses are monitored closely to ensure that they are scrubbing the gases to remove all pollutants. The scrubbers and baghouses require an adequate level of alumina (the scrubbing material) to flow across the bed, a cleaning air pulse rate to keep material from building up on the dust collection bags and a proper flow rate of alumina through the scrubber. The devices that measure these parameters are affected from time to time due to condensed water in the compressed air lines. When this occurs, maintenance is notified to rectify the issues. During this time, the pulse, feed and discharge rates are run in manual by the operators who continually monitor these devices to ensure they are running optimally until the water issues can be remedied by maintenance.

Magnitude 7 Metals
CB2 Scrubber 8

13-May-21				
Averages	2.41	8.54	34,970	
Date/Time	Bag Press (in. H ₂ O)	Bed Press (in. H ₂ O)	Air Flow Rate (SCFM)	Alumina Flow
13-May-21 11:20	3.05	8.89	34,500	35
13-May-21 11:25	3.97	8.50	34,599	35
13-May-21 11:30	3.71	8.51	34,380	42
13-May-21 11:35	3.76	8.69	34,380	28
13-May-21 11:40	3.23	8.76	33,930	35
13-May-21 11:45	2.79	8.92	34,170	35
13-May-21 11:50	3.45	8.41	34,220	42
13-May-21 11:55	3.50	8.58	34,770	28
13-May-21 12:00	3.05	8.58	34,050	42
13-May-21 12:05	3.43	8.84	35,820	28
13-May-21 12:10	3.26	8.77	36,090	35
13-May-21 12:15	4.15	8.81	38,580	35
13-May-21 12:20	3.45	8.86	37,140	42
13-May-21 12:25	2.48	9.28	37,980	28
13-May-21 12:30	3.03	9.12	37,680	35
13-May-21 12:35	3.16	9.01	37,980	35
13-May-21 12:40	1.93	8.55	34,690	35
13-May-21 12:45	1.32	8.72	33,832	42
13-May-21 12:50	1.31	8.58	34,220	28
13-May-21 12:55	1.56	8.52	34,980	0
13-May-21 13:00	1.58	8.54	34,980	0
13-May-21 13:05	1.62	8.35	35,000	0
13-May-21 13:10	1.29	8.39	34,500	0
13-May-21 13:15	0.95	8.62	35,120	0
13-May-21 13:20	1.33	8.30	34,262	0
13-May-21 13:25	1.15	8.76	34,240	0
13-May-21 13:30	1.69	8.41	34,360	0
13-May-21 13:35	2.08	8.33	34,170	0
13-May-21 13:40	1.47	8.34	34,240	0
13-May-21 13:45	1.20	8.36	34,320	0
13-May-21 13:50	1.48	8.48	34,400	0
13-May-21 13:55	1.78	8.35	34,220	0
13-May-21 14:00	2.04	8.05	34,380	0
13-May-21 14:05	2.56	8.03	33,870	0
13-May-21 14:10	2.30	7.81	34,090	7
13-May-21 14:15	2.38	7.89	34,530	0
13-May-21 14:20	2.57	7.96	35,200	0

CB3 Run #1 Reactor 10

Run 1		11-May-21	Scrubbers 10 & 12	
Averages		5.44	5.67	34,868
Date/Time		Bag Press (in. H ₂ O)	Bed Press (in. H ₂ O)	Air Flow Rate (SCFM)
5/11/21 11:05		5.26	5.96	35350
5/11/21 11:10		5.18	6.31	34946
5/11/21 11:15		5.23	6.51	35370
5/11/21 11:20		5.35	6.21	35160
5/11/21 11:25		5.30	6.28	34961
5/11/21 11:30		5.22	6.27	35430
5/11/21 11:35		5.36	6.25	35510
5/11/21 11:40		5.32	6.23	35330
5/11/21 11:45		5.42	6.13	35270
5/11/21 11:50		5.47	6.22	35180
5/11/21 11:55		5.45	6.17	35100
5/11/21 12:00		5.60	5.94	34960
5/11/21 12:05		5.59	6.08	35720
5/11/21 12:10		5.44	6.28	35330
5/11/21 12:15		5.75	6.10	35928
5/11/21 12:20		5.72	6.37	35290
5/11/21 12:25		5.83	6.41	35840
5/11/21 12:30		5.82	6.39	37700
5/11/21 12:35		5.92	6.18	37430
5/11/21 12:40		5.90	5.92	37980
5/11/21 12:45		5.77	6.24	38380
5/11/21 12:50		5.07	4.99	33520
5/11/21 12:55		5.00	5.22	33640
5/11/21 13:00		5.29	4.72	33740
5/11/21 13:05		5.07	5.27	33562
5/11/21 13:10		5.30	4.83	33910
5/11/21 13:15		5.28	4.97	34050
5/11/21 13:20		5.43	4.67	33930
5/11/21 13:25		5.40	4.95	33430
5/11/21 13:30		5.24	5.24	33890
5/11/21 13:35		5.35	4.97	33310
5/11/21 13:40		5.34	4.86	33998
5/11/21 13:45		5.38	5.00	33680
5/11/21 13:50		5.43	4.86	33290
5/11/21 13:55		5.50	5.09	33830
5/11/21 14:00		5.45	5.24	33480
5/11/21 14:05		5.46	5.26	34380
5/11/21 14:10		5.66	5.29	34010
5/11/21 14:15		5.73	5.22	34030

CB3 Run #1 Reactor 12

Run 1		11-May-21	Scrubbers 10 & 12	
Averages		5.73	10.00	32,233
Date/Time		Bag Press (in. H ₂ O)	Bed Press (in. H ₂ O)	Air Flow Rate (SCFM)
5/11/21 11:05		5.32	10.00	29690
5/11/21 11:10		5.26	10.00	29617
5/11/21 11:15		5.36	10.00	29620
5/11/21 11:20		5.44	10.00	29980
5/11/21 11:25		5.39	10.00	29600
5/11/21 11:30		5.41	10.00	29190
5/11/21 11:35		5.40	10.00	29440
5/11/21 11:40		5.45	10.00	29460
5/11/21 11:45		5.45	10.00	29300
5/11/21 11:50		5.47	10.00	29210
5/11/21 11:55		5.43	10.00	29560
5/11/21 12:00		5.57	10.00	29400
5/11/21 12:05		5.73	10.00	30080
5/11/21 12:10		5.67	10.00	30080
5/11/21 12:15		6.00	10.00	30178
5/11/21 12:20		5.83	10.00	30590
5/11/21 12:25		6.07	10.00	31600
5/11/21 12:30		5.83	10.00	32160
5/11/21 12:35		5.86	10.00	32140
5/11/21 12:40		5.83	10.00	32100
5/11/21 12:45		6.06	10.00	33600
5/11/21 12:50		6.00	10.00	33560
5/11/21 12:55		6.09	10.00	34200
5/11/21 13:00		6.02	10.00	34380
5/11/21 13:05		5.93	10.00	34908
5/11/21 13:10		5.98	10.00	35040
5/11/21 13:15		5.92	10.00	35230
5/11/21 13:20		5.95	10.00	35680
5/11/21 13:25		5.95	10.00	34690
5/11/21 13:30		5.81	10.00	34870
5/11/21 13:35		5.80	10.00	34690
5/11/21 13:40		5.80	10.00	34383
5/11/21 13:45		5.77	10.00	34900
5/11/21 13:50		5.77	10.00	34520
5/11/21 13:55		5.79	10.00	34260
5/11/21 14:00		5.77	10.00	34520
5/11/21 14:05		5.81	10.00	33950
5/11/21 14:10		5.72	10.00	33410
5/11/21 14:15		5.70	10.00	33310

CB3 Run #2 Reactor 10

Run 2	12-May-21	Scrubbers 10 & 11		
Averages	7.34	7.62	31,797	
Date/Time	Bag Press (in. H ₂ O)	Bed Press (in. H ₂ O)	Air Flow Rate (SCFM)	Alumina Flow
5/12/21 7:55	7.40	7.00	32530	28
5/12/21 8:00	7.56	6.89	32260	28
5/12/21 8:05	7.27	7.26	32590	28
5/12/21 8:10	7.64	6.96	32070	21
5/12/21 8:15	7.39	7.16	32770	28
5/12/21 8:20	7.32	7.29	32200	28
5/12/21 8:25	7.41	7.34	31620	28
5/12/21 8:30	7.37	7.41	32120	21
5/12/21 8:35	7.34	7.40	31620	28
5/12/21 8:40	7.30	7.47	32015	28
5/12/21 8:45	7.39	7.50	32340	21
5/12/21 8:50	7.35	7.33	32160	35
5/12/21 8:55	7.32	7.61	31950	21
5/12/21 9:00	7.40	7.40	32120	28
5/12/21 9:05	7.30	7.64	31385	28
5/12/21 9:10	7.33	7.47	31950	21
5/12/21 9:15	7.28	7.87	31620	35
5/12/21 9:20	7.46	7.44	31500	21
5/12/21 9:25	7.37	7.46	31793	21
5/12/21 9:30	7.21	7.64	31520	28
5/12/21 9:35	7.35	7.74	31830	28
5/12/21 9:40	7.36	7.66	30920	28
5/12/21 9:45	7.25	7.65	31730	28
5/12/21 9:50	7.23	8.12	31720	21
5/12/21 9:55	7.24	7.92	32630	28
5/12/21 10:00	7.46	8.05	31580	28
5/12/21 10:05	7.27	8.13	31830	28
5/12/21 10:10	7.21	8.11	31580	28
5/12/21 10:15	7.37	7.95	31660	21
5/12/21 10:20	7.29	8.20	31810	28
5/12/21 10:25	7.37	8.21	31770	28
5/12/21 10:30	7.38	7.96	31680	28
5/12/21 10:35	7.17	7.89	31500	28
5/12/21 10:40	7.29	7.73	31400	21
5/12/21 10:45	7.29	7.76	30940	28
5/12/21 10:50	7.39	7.78	31330	28
5/12/21 10:55	7.23	7.77	31370	21
5/12/21 11:00	7.39	7.51	30859	56

CB3 Run #3 Reactor 10

Run 3		12-May-21	Scrubbers 10 & 11	
Averages		7.09	8.94	29,432
Date/Time		Bag Press (in. H ₂ O)	Bed Press (in. H ₂ O)	Air Flow Rate (SCFM)
5/12/21 11:25		7.15	8.16	30860
5/12/21 11:30		7.10	8.18	30350
5/12/21 11:35		7.37	7.85	30840
5/12/21 11:40		7.29	8.09	30200
5/12/21 11:45		7.15	8.28	29830
5/12/21 11:50		7.24	8.23	30430
5/12/21 11:55		7.08	8.32	30490
5/12/21 12:00		7.15	8.41	29830
5/12/21 12:05		7.13	8.55	29965
5/12/21 12:10		7.11	8.59	29750
5/12/21 12:15		7.26	8.47	29790
5/12/21 12:20		7.33	8.32	30180
5/12/21 12:25		7.08	8.76	30020
5/12/21 12:30		7.02	8.72	30000
5/12/21 12:35		7.05	9.02	29783
5/12/21 12:40		6.98	9.14	29440
5/12/21 12:45		7.09	8.83	29560
5/12/21 12:50		7.15	8.78	29580
5/12/21 12:55		7.08	9.06	29095
5/12/21 13:00		7.02	9.07	28970
5/12/21 13:05		7.12	9.10	29110
5/12/21 13:10		7.16	9.00	29238
5/12/21 13:15		7.10	9.26	28950
5/12/21 13:20		7.03	9.21	28760
5/12/21 13:25		7.10	9.00	29057
5/12/21 13:30		7.07	9.35	29030
5/12/21 13:35		7.08	9.03	29210
5/12/21 13:40		7.01	9.23	28900
5/12/21 13:45		7.06	9.49	29010
5/12/21 13:50		7.14	9.08	28970
5/12/21 13:55		7.00	9.63	28800
5/12/21 14:00		7.02	9.65	28766
5/12/21 14:05		6.99	9.71	28660
5/12/21 14:10		6.96	9.65	28880
5/12/21 14:15		6.90	9.42	28410
5/12/21 14:20		7.09	9.56	28230
5/12/21 14:25		6.83	9.89	28580
5/12/21 14:30		6.94	9.69	28880

CB3 Run #3 Reactor 11

Run 3		12-May-21	Scrubbers 10 & 11	
Averages		2.09	9.24	31,635
Date/Time		Bag Press (in. H ₂ O)	Bed Press (in. H ₂ O)	Air Flow Rate (SCFM)
5/12/21 11:25		2.10	8.45	30490
5/12/21 11:30		2.10	8.45	30530
5/12/21 11:35		2.00	8.45	31770
5/12/21 11:40		2.15	8.52	31350
5/12/21 11:45		2.15	8.54	30020
5/12/21 11:50		2.15	8.55	30280
5/12/21 11:55		2.15	8.56	30780
5/12/21 12:00		2.14	8.58	31420
5/12/21 12:05		2.13	8.59	31442
5/12/21 12:10		2.13	8.67	31540
5/12/21 12:15		2.18	8.60	31560
5/12/21 12:20		2.19	8.75	30120
5/12/21 12:25		2.19	8.76	31480
5/12/21 12:30		2.20	8.79	31270
5/12/21 12:35		2.20	9.30	32683
5/12/21 12:40		2.19	9.33	31580
5/12/21 12:45		2.19	9.32	32320
5/12/21 12:50		2.19	9.37	30630
5/12/21 12:55		2.18	9.38	32034
5/12/21 13:00		2.18	9.38	31500
5/12/21 13:05		2.18	9.45	31150
5/12/21 13:10		2.17	9.50	31184
5/12/21 13:15		2.17	9.56	32160
5/12/21 13:20		2.17	9.53	31070
5/12/21 13:25		2.16	9.52	31243
5/12/21 13:30		2.16	9.56	30900
5/12/21 13:35		2.16	9.50	31000
5/12/21 13:40		2.15	9.66	32430
5/12/21 13:45		2.15	9.69	32300
5/12/21 13:50		2.01	9.61	31640
5/12/21 13:55		1.72	9.58	31130
5/12/21 14:00		1.83	9.75	31387
5/12/21 14:05		1.87	9.71	31250
5/12/21 14:10		1.82	10.00	31870
5/12/21 14:15		1.93	10.00	32960
5/12/21 14:20		1.94	10.00	33640
5/12/21 14:25		1.95	10.00	35660
5/12/21 14:30		1.96	10.00	34360